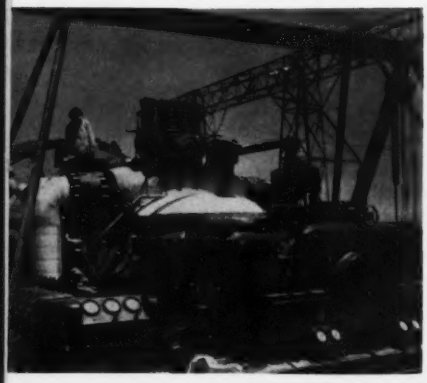
ELECTRICAL WEST

August 1953
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.



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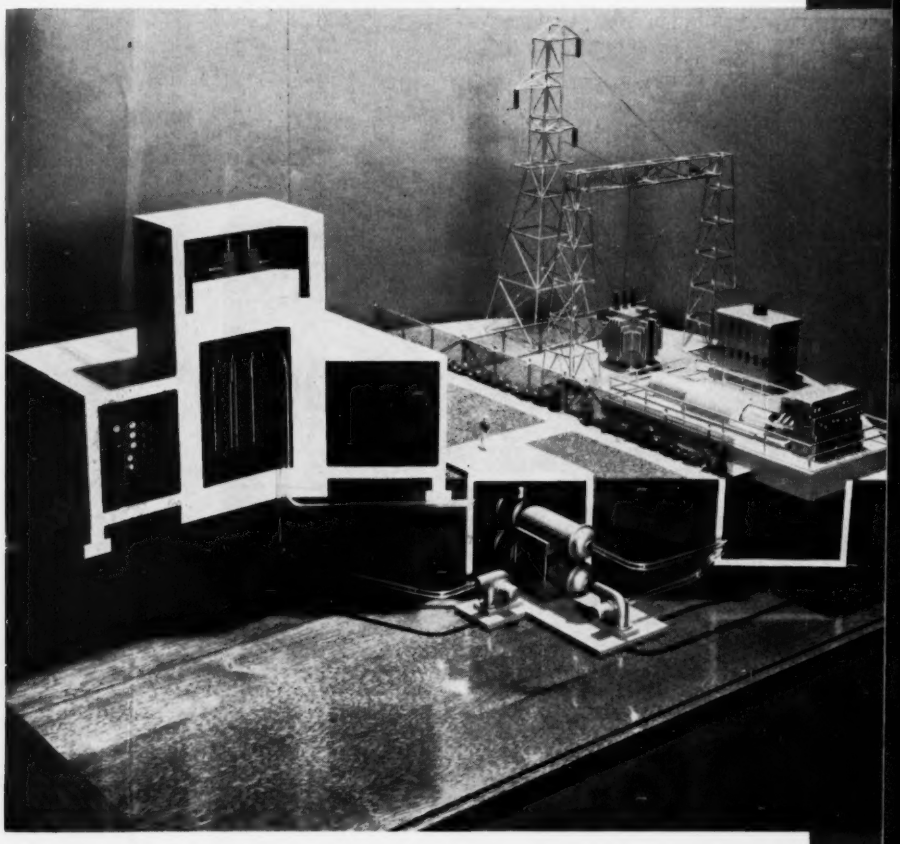

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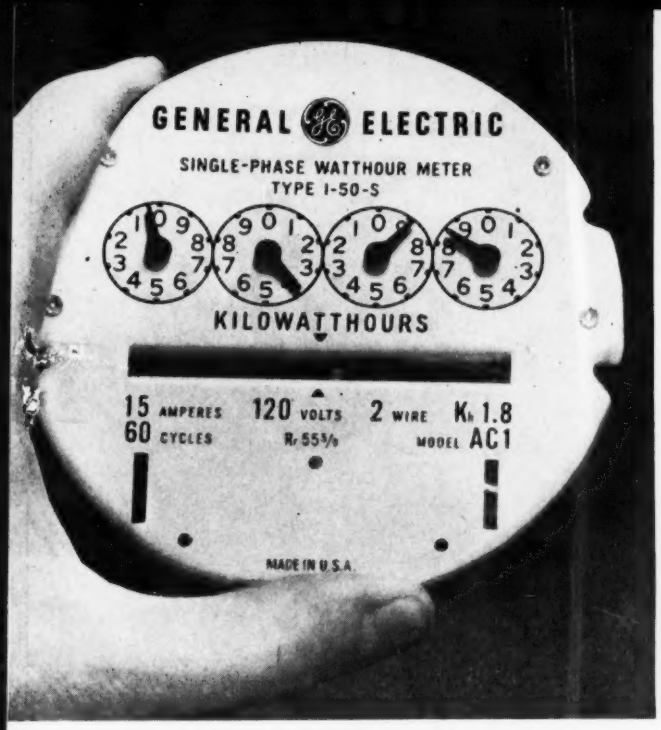
A dozen different ways, Electricity is Today's Biggest Bargain!

Electricity—just about the only thing you can still buy today at pre-inflation prices—is a modern miracle when it comes to bargains! And it's a "bargain" for many reasons other than its low price during these times of high costs and fifty cent dollars.

Electricity has made possible dozens of new industries and new products, and is a necessity for our modern way of life. The chances are that your business is dependent upon electricity to manufacture or process your products; perhaps even your products themselves are electrical.

The low cost of this quick and willing servant in business, industry, the home, and on the farm is just one of *many* reasons we say, "Electricity is today's biggest bargain!"

SOUTHERN CALIFORNIA EDISON COMPANY



With either the pointer register . . .

Or the snap-action cyclometer register . . .

Extra-large Numerals on G-E I-50 Meters Reduce Reading Time, Cut Costly Errors

General Electric certified I-50 watthour meters, with simplified, legible registers, facilitate meter-reading and reduce costly reading errors. With the ease of reading afforded by the cyclometer-register design, new meter readers can be trained quickly and dependably, saving time for meter foremen.

ACCURATE READINGS with the cyclometer register are much easier because the figures are extra-large. And magnetic snap-action trips the cylinders to make sure that no half-numerals are showing. This legibility greatly facilitates self-billing and also helps in eliminating billing errors, customer complaints, and rereading.

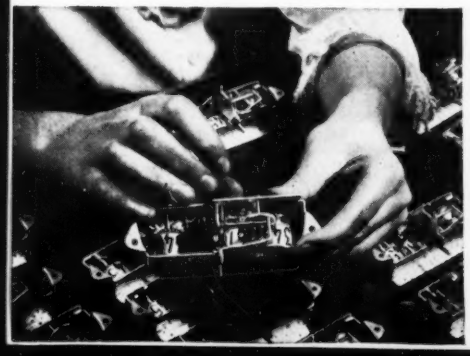
FOR MORE INFORMATION on the G-E certified watthour meter, see the color movie "Accent on Accuracy." Call your nearest G-E representative or write General Electric, Schenectady 5, N. Y. 601-98

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

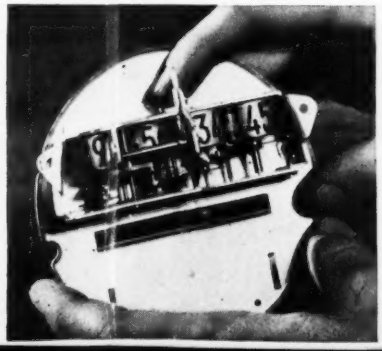
GENERAL ELECTRIC

EASY-TO-READ cyclometer register on I-50 watthour meter has figures four times the conventional size.

REGISTER ACCURACY is assured by frequent factory inspections to give dependable, maintenance-free performance.



FAST RESETTING is easy with plunger to de-mesh gears for first two cylinders. Vertical shafts reduce friction.



SEPARATE REGISTER for installation on present meters makes large-figure legibility available for all meters.

AUGUST 1953

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-sixth year of publication

VOL. 111
NO. 2

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Associate Editor — John Cootz, Typography

Next Month

September is the annual lighting issue. Again we will report outstanding installations in the West. Several of the entries in the "My Most Interesting Lighting Job" IES contest cover exemplary installations from Vancouver, B.C., to southern California.

Other installations to be featured are an outstanding luminous ceiling job for an aircraft drafting room; school lighting promotion in Portland; and the novel practice of leasing commercial lighting installations in Los Angeles.

There also will be a number of short picture-stories covering noteworthy installations in the West.

In engineering there will be several good pieces. Lessons learned from the wrecking of a large impulse water wheel at Bucks Creek power house will interest operating men. A spectacular all-glass-front substation in Vancouver has created favorable comment. The problem of destroying insects in Spokane and the probable answer will interest distribution engineers. Portland has a line truck that performs almost any job. How a utility has effected larger savings by adopting the free-access material plan for automotive parts and the story of uniform safety rules for all utilities in a large area round out engineering.

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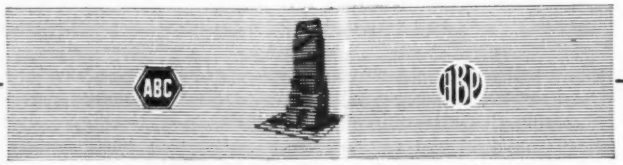

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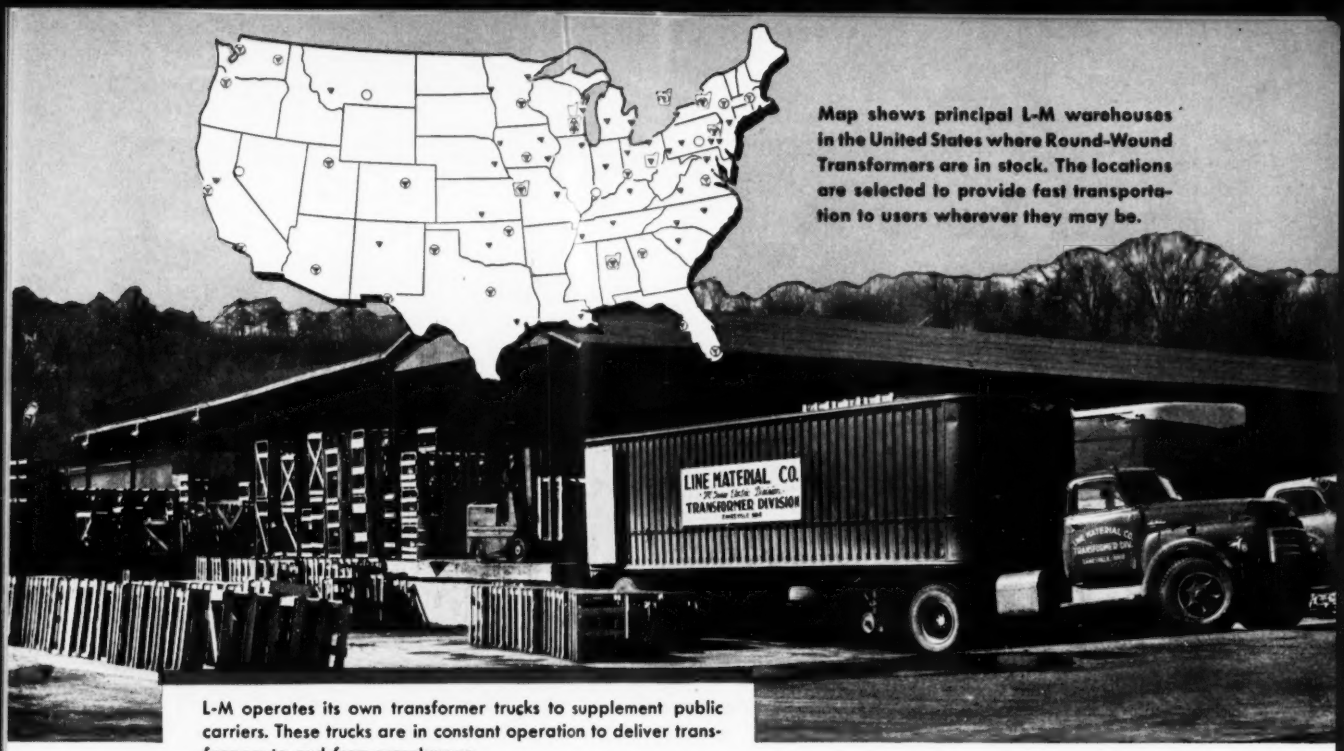


Map shows principal L-M warehouses in the United States where Round-Wound Transformers are in stock. The locations are selected to provide fast transportation to users wherever they may be.

L-M operates its own transformer trucks to supplement public carriers. These trucks are in constant operation to deliver transformers to and from warehouses.

Stocks in 45 Warehouses Assure Prompt Delivery of L-M Round-Wound Transformers

When you need an L-M Round-Wound Transformer fast, L-M can get it there. To take care of customer requirements, L-M years ago set up a system of strategically located warehouses. In recent years production has been substantially increased for the express purpose of augmenting these warehouse stocks. Today most sizes and ratings of L-M Round-Wounds are available in a warehouse near you.

This warehousing service has been designed especially as a "customer plus" service. Operations have been set up to speed the handling of orders. L-M has set up its own transformer truck fleet to provide additional flexibility and faster service in emergencies.

Crating has been designed both for the protection of the transformer and for the convenience of the user. Bases of the crates are designed for lift trucks. High grade heavy lumber is used to assure the greatest possible protection to transformers and bushings.

If you want outstanding transformers, and prompt delivery, ask the L-M Field Engineer about L-M Round-Wound Transformers. Or write for Bulletin DT1, to Line Material Company, Transformer Division, Zanesville, Ohio (a McGraw Electric Company Division).

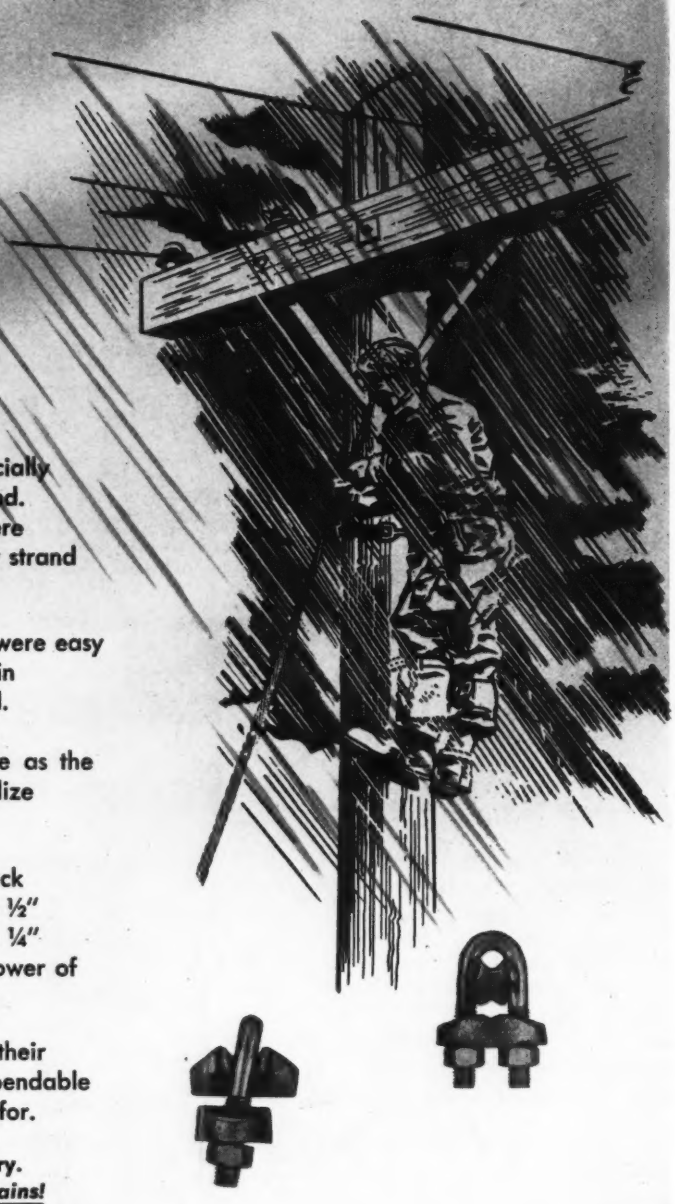
132

Large stocks in all warehouses are designed so they will meet the needs of each particular area. In addition, a system of stock reporting makes it possible to transfer additional transformers promptly should a shortage develop at any one warehouse. Master stocks at the factory are crated, ready for prompt shipment.

"Round-Wound" is a Line Material Company trademark

LINE MATERIAL Transformers

man how it RAINED



. . . and the wind blew. Made every job that much tougher.

Some things were good, though, especially that M. I. F. Guy Clamps were specified. No fumbling around. These clamps were ready for use on a wide range of guy strand diameters,—compact, dependable.

Rain or no rain, M. I. F. Guy Clamps were easy to install. No need to hold the strand in line while the nuts could be tightened. The tilting action, "come-along" grip, actually increased the clamping force as the load increased. "Easing off," to equalize tension, was a smooth operation.

Also: initial low cost, less bulk for truck bins, two sizes accommodating 3/16" to 1/2" diameters (PAX64: 3/16" to 3/8"; PAX67: 1/4" to 1/2"), low weight, higher holding power of M. I. F. Guy Clamps.

Right now, what really counted was their VERSATILITY — the simplest, most dependable pole line hardware a man could ask for.

BULLETIN PH1 has the whole story. Write for a copy . . . *before it rains!*

MIF

MALLEABLE IRON FITTINGS CO.

Pole Hardware Division **Branford, Connecticut**

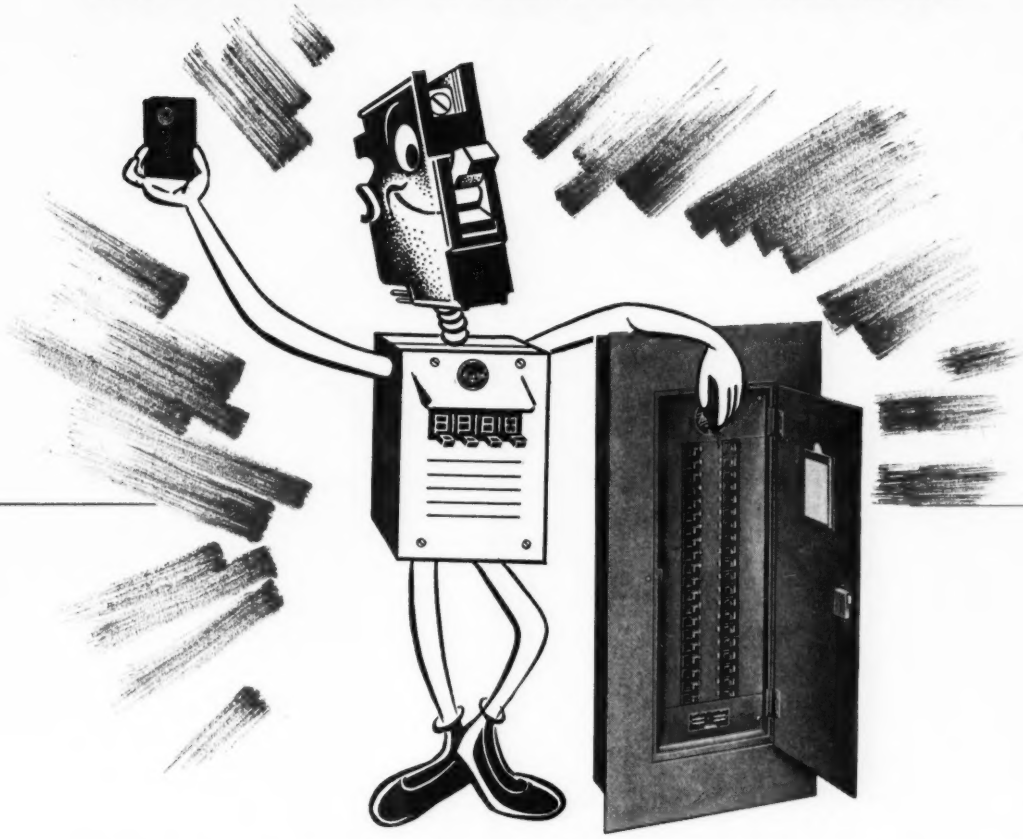
N. Y. Office: 30 Church St.

Canadian Mfr. & Dist.: LINE & CABLE ACCESSORIES, Ltd. TORONTO

Representatives: William J. Cottrell Co., Portland, Ore. • James H. Drew Corp., Indianapolis, Ind. • Industrial Engr. & Equip. Corp., Los Angeles, Cal. • JSG Electric Co., Chicago, Ill. • B. H. McCain, Knoxville, Tenn. • E. A. Thornwell, Inc., Atlanta, Georgia • J. P. Voight, Summerville, S. C. • Waltham, DeWitt & Krusi, San Francisco, Calif. • L. G. Wendeguts, Kansas City, Mo. • Williams Sales Co., Fort Myers, Fla. • Williamson Sales Co., Shreveport, La. • O. C. Witte Co., Detroit, Mich.

WE DARE YOU!

Just try to stump the Stab-lok® System with any logical combination of circuit breaker requirements



ONE CIRCUIT or 20 circuits... add range and hot water heater! You can't find a sensible specification for circuit breaker protection that the sequence bussed Stab-lok can't meet with ease, speed and economy!

Electric radiant heating? Stab-lok LA2600 takes that in stride. A 42-circuit panelboard? You can assemble it in minutes, from your distributor's stock. Single phase or 3 phase, 4 wire? Stab-lok gives you a real choice.

Stab-lok's *complete* range of enclosures meets all needs, even for special applications. With 3MBA, for instance, you can convert a multi-breaker into a Stab-lok in next to no time. Most enclosures are the Noark flush-surface type and practically cut your stock requirements in half.

Last, but not least, the Stab-lok system slashes installation costs. Enclosures have ample wiring space... backplate is removable for wire pulling ...all components are accessible. Write for the whole Stab-lok story...and order Stab-loks from your distributor today.

Federal Electric Products Company, 50 Paris St., Newark 5, N. J.

Federal Noark products: Stab-lok Circuit Breakers, Motor Controls, Safety Switches, Service Equipment, Industrial Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

FEDERAL NOARK®

Federal NOARK

Meeting the Nation's Growing Power Load

Westinghouse "Big Ben" world's highest interrupting capacity!

25,000,000 KVA at 330 KV

A most important question facing America's Utilities today is—"How do we transmit larger blocks of power at a cost low enough to make it practical and profitable?" The right answers to that question are receiving daily attention at Westinghouse.

One of the most recent answers is 330-kv transmission. "Big Ben"—the largest circuit breaker ever built, has been designed by Westinghouse to protect such a system. It is a 3-cycle interrupting, 20-cycle reclosing breaker capable of interrupting 25,000,000 kva and rated at 1600 amperes continuous current. This tremendous increase in breaker rating permits greater concentration of generating capacity . . . more extensive system interconnection . . . eliminates duplication of transmission facilities. Thus total system investment is minimized, and operating and maintenance costs reduced.

This design is an extension of the low-oil-content, dead-tank "Watchcase*" design—developed and perfected after 28 years of High Power Laboratory testing, and proved by field service.

Such products of research and design development give assurance to Electric Utilities that the race to economically satisfy America's growing power appetite will be won. The Westinghouse quest for more efficient, lower cost apparatus will continue to equip Utilities today—for tomorrow!

*Trade-Mark

J-97174-A

"Big Ben"... Low-Oil Content... Dead Tank

9600 gallons instead of 20,000! The low-oil-content, "Watchcase" tank of the Westinghouse "Big Ben" requires only 9600 gallons of oil as compared with the 20,000 gallons needed for a conventional round tank. Thus this breaker saves weight, space, oil-handling costs and time, but retains the reliability, safety and economy of the time-proved, dead-tank design.

Condenser-Type Bushings

This high-voltage breaker design was made possible by the fundamentally sound electrical principle of Westinghouse Condenser Bushings. Equal capacitance steps, from high-tension stud to grounded flange, are obtained by layers of oil-impregnated kraft paper interspersed with layers of metal foil, carefully machine wrapped under close control. The resultant uniform voltage gradient in the Condenser and over the porcelain weather casing prevents areas of high-voltage stress, and thus eliminates radio interference. Add over-all, high cantilever strength of the bushing design . . . moisture-proof construction . . . low power factor . . . and you have high bushing efficiency and long life.

One Pneumatic Operating Mechanism

A single pneumatic mechanism simultaneously operates all 3 poles of "Big Ben". It is *mechanically* and electrically trip free. Contacts open without restraint since opening speed is independent of air pressure or exhaust time. The pneumatic mechanism (AA-14), with its 14″ piston used to close "Big Ben", has the same manufacturing precision and simple accessible mechanical lever system that has been so successful on the AA-7 and the AA-10 mechanisms. These have been used on the complete range of Westinghouse Oil Circuit Breakers from 15 kv, 500,000 kva through 330 kv, 25,000,000 kva. High-speed (20 cycles or better) reclosing characteristics are provided as required.

De-ion® Arc Control

Only two interrupters per pole are used to obtain "Big Ben's" 25,000,000-kva interrupting rating within three cycles. This minimum number of contacts—requiring less maintenance—is possible because of the multi-flow, jet orifice-type interrupter. This De-ion grid uses self-generated oil flow to interrupt medium and high currents and mechanically pumped oil to interrupt load and charging currents . . . all in three cycles. During interruption, oil and gas flow in the grid are balanced, so that high stresses do not reach bushings nor shift alignment. Interruption following a high-speed reclosing is effective because of the high-speed scavenging action of the pump, replenishing the oil supply of the interrupting chamber with fresh oil after each operation.

• • •

Additional advantage of the dead-tank design is that it makes possible the low-cost bushing potential device and bushing-type current transformers. Six potential devices—one per bushing—and a total of 18 current transformers can be provided in each breaker. Accurate billing metering, relaying or linear coupler applications are possible.

For further details on "Big Ben" and similar oil-type circuit breakers for high-voltage transmission, call your Westinghouse Representative—or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

YOU CAN BE SURE... IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Build lines to stay with the CHANCE 8-Way

For best results, use the anchor that pushes *eight* blades into undisturbed earth all around the hole, with no wasted space between blades. This means complete, balanced load distribution.

Chance 8-way Anchors are available in a complete range of sizes from 60 to 200 square inches in area, for distribution or transmission line guying. Get full information today—consult your Chance Catalog—order from your regular supplier.

the CHANCE 8-WAY *gives full load distribution*

Anchor installations are *faster, easier* and *better* when line crews use the right tools. Chance tools are designed for efficiency and safety. The tools shown at right are what you need for expanding anchor installations.

1. Chance Combination Expanding and Tamping Bar. It hooks around the anchor rod and will not slip off.
2. Chance Telescoping Trip Auger—it bores like a bit, adjusts for various hole sizes, and has an easy dump trip.

Send for the Chance folder on the tools to use for better anchor installations.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS

C53-4A

UTILITY'S NEW

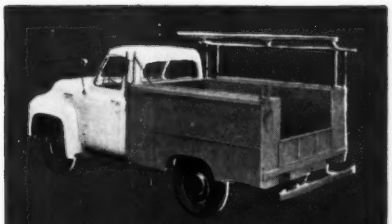
Service Bodies

Series E: Enclosed superstructure body carries maximum supplies in a minimum of space.

7 WAYS BETTER

1. Better because they incorporate recommendations from operators throughout the public utility industries.
2. Better because they are economical . . . normally outlasting two or three truck chassis.
3. Better because they are real time-savers. All tools and supplies in special compartments . . . quick to locate . . . return trips eliminated.
4. Better because of special features . . . double panel doors, full 48" bed width, sliding steel roof, ribbed top panels, and many other outstanding improvements.
5. Better because new flush-type door locks with pull-out handles, slam-action catches and master-keyed locks facilitate handling.
6. Better because of time-tested construction. Engineered for lighter weight and larger load space.
7. Better because of added protection . . . body base is undercoated and all metal surfaces are acid-etched before painting.

Utility Bodies available for all ½, ¾, and 1-ton trucks.



Series S: Service body . . . puts waste space to work without decreasing bed space.

Series U: Utility compartment sections . . . convert standard pick-up to general service unit. Easily mounted in your own garage.

Many Utility Body styles not shown here. Write for catalog.

UTILITY BODY Company

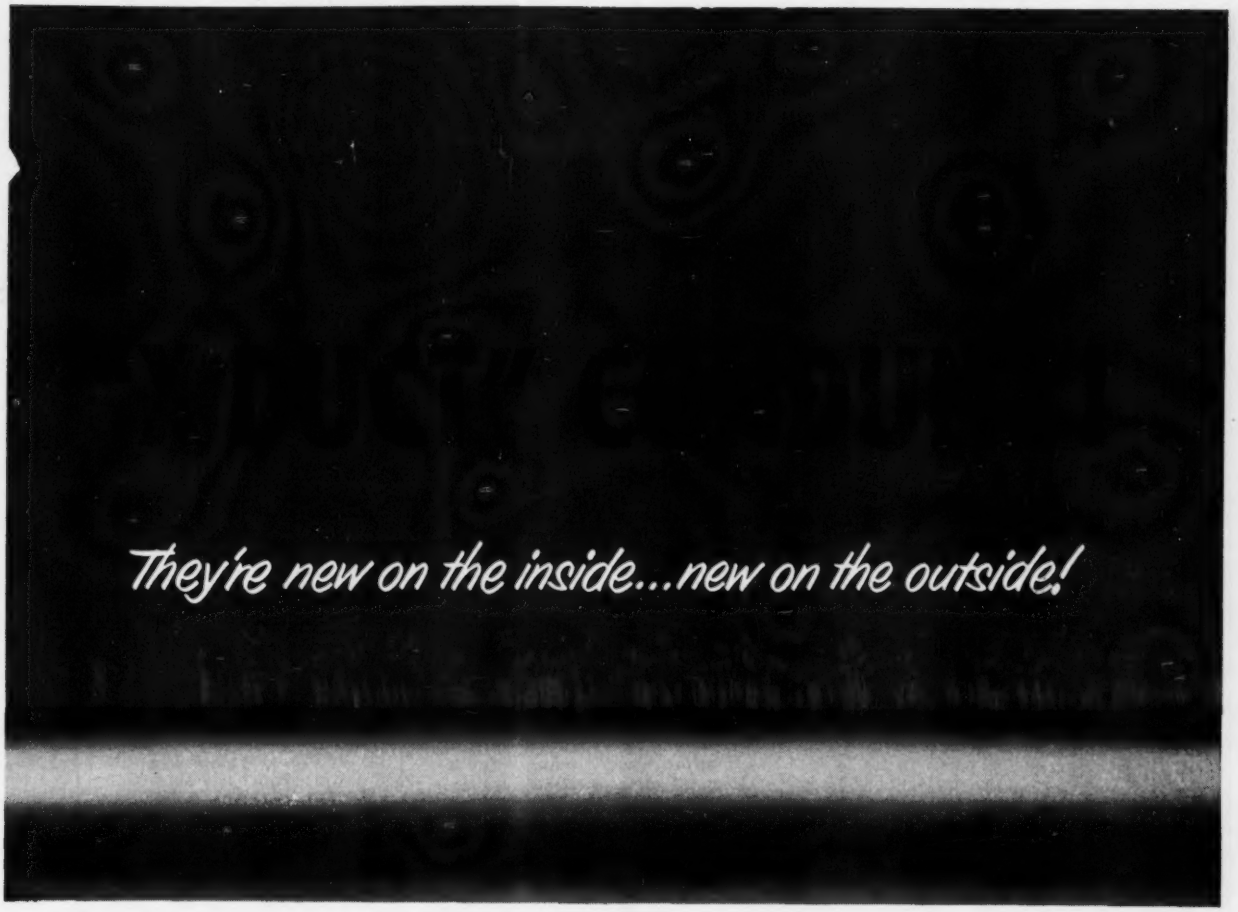
1530 WOOD STREET TWinoaks 3-8980 OAKLAND 7, CALIFORNIA

"XDUCT JR." ELECTRICAL METALLIC TUBING

FISHING IS EASY WITH

"X DUCT" CONDUIT

Proved best by actual fish test!



"XDUCT" RIGID STEEL THREADED CONDUIT

Here's what these new conduits mean to you!

1. EASY FISHING—"XDuct's" new aluminum enamel inside coating (patent applied for) was developed through intensive research in connection with important government projects. It provides lubrication as friction builds up between conduit wall and wires. The result: Actual fishing tests conducted with five other leading brands of conduit prove "XDuct" is 66% easier to fish on constant pull—more than twice as easy to start as the second best conduit.

2. SUPERIOR CORROSION RESISTANCE—National Electric's revolutionary new patented electrogalvanizing process electrolytically deposits pure zinc *uniformly* over the entire outside surface of "XDuct" conduit, including the threads. The result: a protective coating that adheres positively to the basic steel . . . possesses superior corrosion resisting qualities.

3. THREAD PROTECTION—Sharp, clean threads of "XDuct" rigid steel conduit are machined *before* galvanizing to assure complete protection from end to end. The result: every hill and valley of threads are completely galvanized.

4. SUPERIOR BENDING—High-ductile steel is used to assure easy bending.

5. DESIRABLE COLOR—"XDuct's" silvery color is highly acceptable for installation in exposed locations.

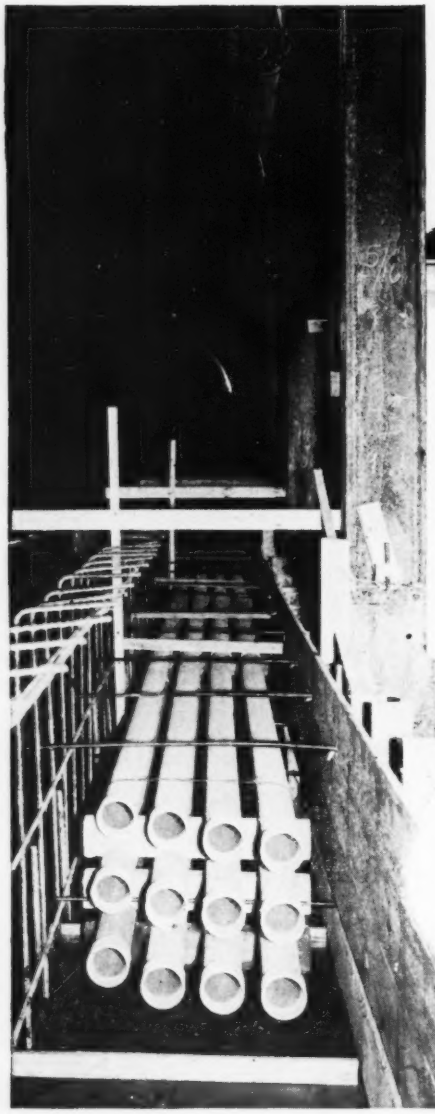
EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 34 Sales Offices

LISTED BY UNDERWRITERS' LABORATORIES, INC. • STOCKED BY LEADING ELECTRICAL WHOLESALERS EVERYWHERE



Incombustible...

That's why TRANSITE® DUCTS confine burn-outs and protect adjacent cables

DESPITE modern precautions, the burn-out is still a potential hazard. Consequently, cables should be given the maximum fireproof protection that Transite Ducts provide.

Transite Ducts confine burn-outs, safeguard adjacent cables from damage and reduce the possibilities of panic and explosion because they are incombustible throughout. Made of nonflammable asbestos and cement, Transite Ducts will not burn, smoulder or generate smoke or fumes. They cannot contribute to the formation of explosive gases.

Nowhere is the fireproof protection of Transite Ducts so necessary as in such vital locations as subways, tunnels and power plants.

As the panel below shows, incombustibility is only one of the advantages of Transite Ducts. For more information, write Johns-Manville, Box 60, New York 16, N. Y.

4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

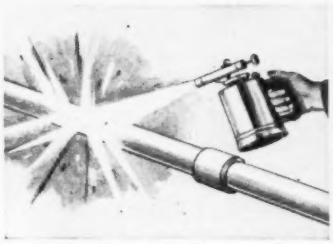
1. Corrosion-Resistant. Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.

2. Permanently Smooth Bore. Transite makes long cable pulls easy. Danger of damage to cables is also minimized.

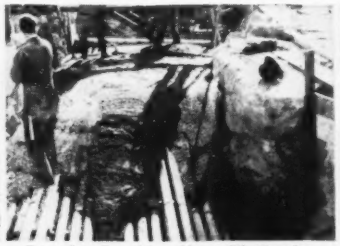
3. Easy To Install. Transite Ducts are light weight, easy to handle. Joints are quickly made. And long 10-ft. lengths reduce the number of joints in line.

4. High Thermal Conductivity. Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

In Subways, where passenger safety is paramount, fireproof Transite Ducts will, in the event of a burn-out, confine it and reduce the hazard of panic.



Transite Does Not Burn, smoke or fume because its ingredients, asbestos and cement, will not support combustion. It cannot contribute to the formation of explosive gases.



Transite Provides Heat Dissipation, Too. In addition to providing fireproof construction, Transite Ducts permit cables to run cooler, reducing I^2R losses.

Photograph courtesy of Triborough Bridge and Tunnel.

In Vehicular Tunnels, if a burn-out should occur, Transite Ducts limit damage, permit speedier repair and an earlier re-opening for traffic.

JOHNS-MANVILLE JM PRODUCTS

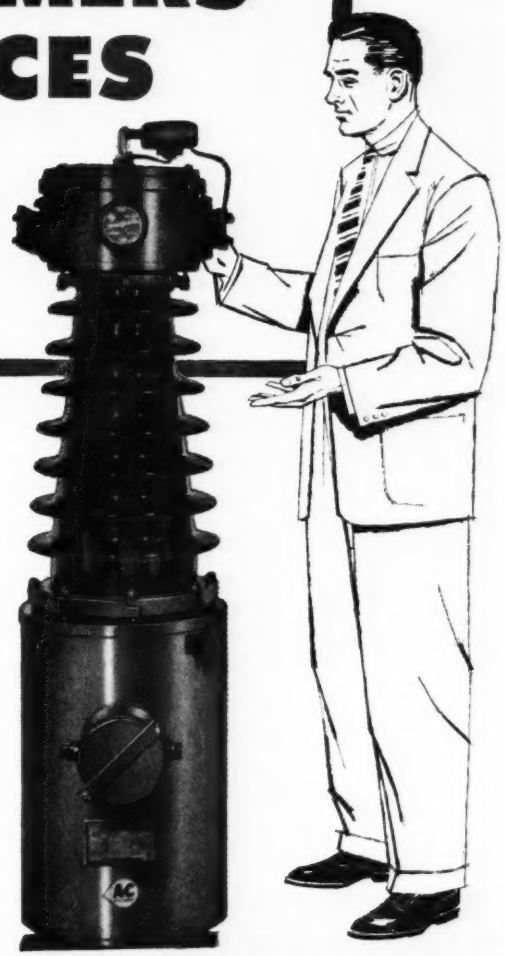
Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

ALLIS-CHALMERS INTRODUCES

New Line of Outdoor Current Transformers



Featuring:

- ★ **Weight Reductions Up to 54% Compared With Previous Designs**
- ★ **High Thermal Rating**
- ★ **Increased Mechanical Strength**
- ★ **Corona-Free Design for Long Insulation Life**

HERE IS A COMPLETELY NEW LINE of current transformers for outdoor use on power circuits 69 kv and below. They bring you many advances, including design features that result in excellent performance, high thermal and mechanical strength, improved insulation life, and mechanical advantages that simplify installation.

Most important, their ruggedness has been proved by exhaustive tests. Temperature rise at normal current is low, allowing ample overcurrent in emergencies. The transformers are rated 65 times normal primary current under short circuit conditions.

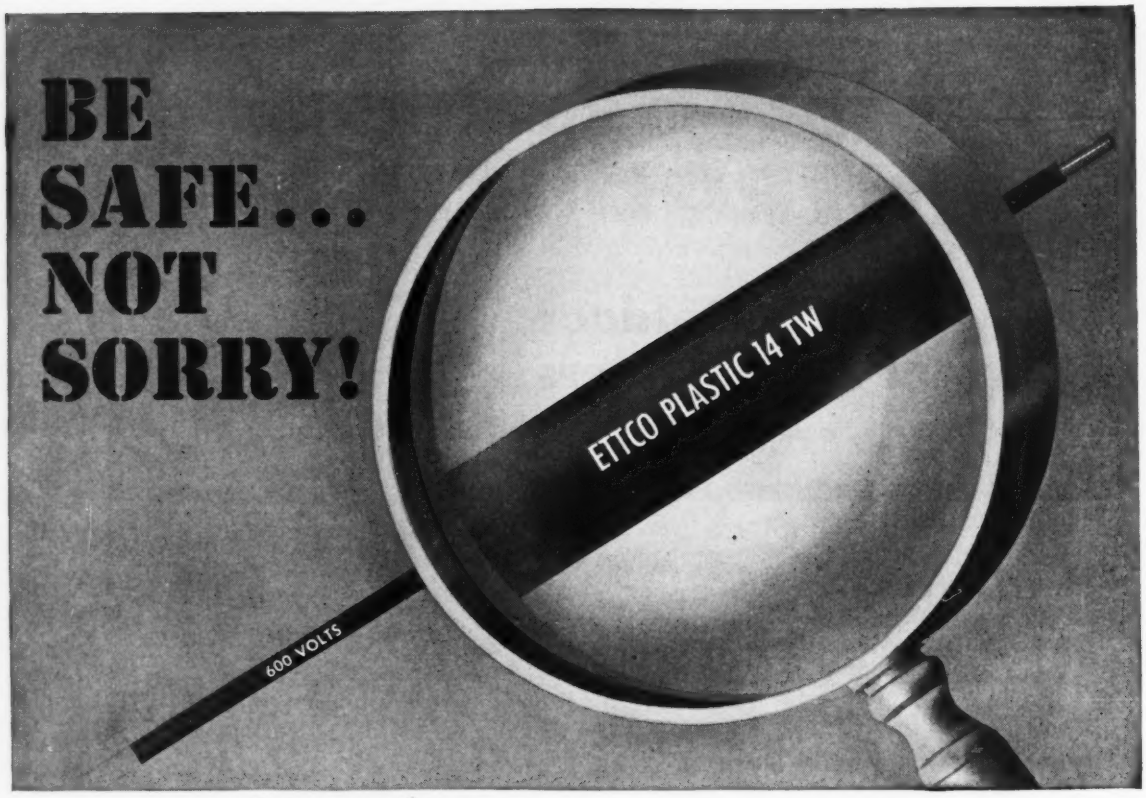
For the complete story get your copy of the paper "Progress in Instrument Transformer Design" by writing Allis-Chalmers, Milwaukee 1, Wisconsin. A-4109

LESS WEIGHT — LESS FLOOR SPACE
Compare New Type SCW with Previous Designs

Kv.	Design	Height	Floor Space	Gal. Oil	Weight (lbs.)
25	New Type SCW	42″	14″ x 19″	9	230
	Previous Type	33″	22″ x 22″	15	490
34.5	New Type SCW	45″	14″ x 19″	9½	230
	Previous Type	33″	22″ x 22″	15	490
46	New Type SCW	55″	16″ x 23″	16	475
	Previous Type	40½″	23″ x 23″	18½	500
69	New Type SCW	61″	16″ x 23″	18	525
	Previous Type	46½″	28½″ x 28½″	35	1000

ALLIS-CHALMERS

A-C ALLIS-CHALMERS



SPECIFY Ettco TW BUILDING WIRE

(newest member of the Ettco family!)

- small diameter Thermoplastic Wire resists severe exposure!
- lubricated for easy pulling!
- easiest, cleanest stripping ever!
- saves initial and maintenance costs . . . installation time!
- laboratory tested and inspected!
- packaged in handy cartons!

Representatives and warehouses in the following principal cities:

Atlanta, Ga.	Denver, Col.	Louisville, Ky.	Portland, Ore.
Boston, Mass.	Detroit, Mich.	Minneapolis, Minn.	San Franscico, Cal.
Cleveland, O.	Greensboro, N. C.	New Orleans, La.	Seattle, Wash.
Chicago, Ill.	Houston, Tex.	New York, N. Y.	St. Louis, Mo.
Dallas, Tex.	Los Angeles, Cal.	Philadelphia, Pa.	Syracuse, N. Y.
			Washington, D. C.

SOLD THROUGH ELECTRICAL WHOLESALERS ONLY

OTHER PREMIUM quality electrical products by

Ettco

- Bushed Armored Cable
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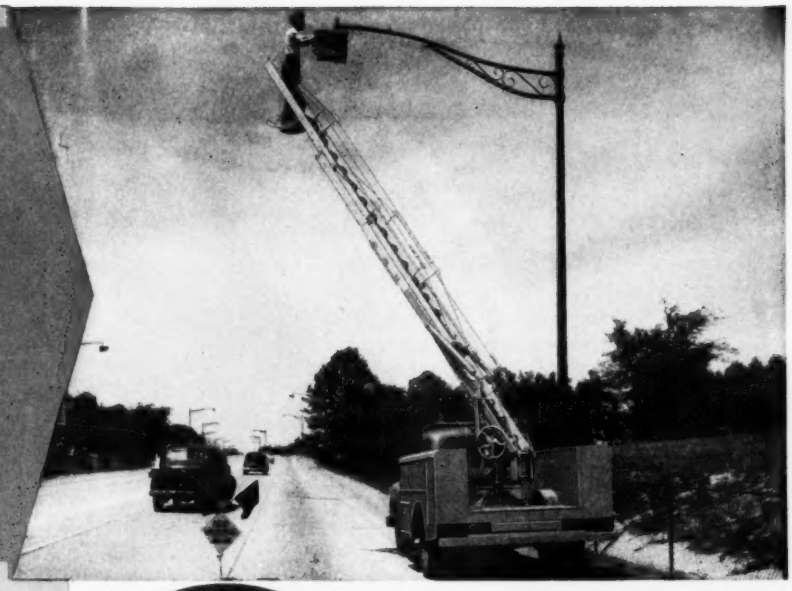
General Offices: 46-50 Metropolitan Avenue • Brooklyn 37, New York

Plant: 75 Onderdonk Avenue • Brooklyn 37, New York

THIRTY FEET HIGH in THIRTY SECONDS

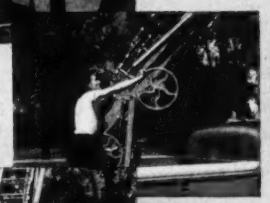


Simple, Easy, One-Man Operation

1. Ladder hold-down on cab roof is released.

2. Pressure is applied to lower ladder rung.

3. Ladder is locked in elevated position.



4. Upper section is extended to desired height.

5. Ladder is rotated to spotting position.

6. Incline of ladder is adjusted as required.

POWERS *American* SERIES 5510

REVOLVING AERIAL LADDER

Sounds unbelievable . . . but the *Powers-American* Aerial Ladder is so simple, so fast, and so easy to operate that it can be raised to a working position in only 30 seconds—by *one man!* This versatile ladder can be spotted in 40 positions throughout a 360° revolution . . . inclined to any angle from 30 to 75 degrees. Its curved platform falls into position automatically—to provide a level working surface. What's more, this ladder is so safe that it will support *five* times the normal working load. If your operation calls for overhead work, get all the facts on *Powers-American* Aerial Ladders. Mail the coupon NOW for complete information.

POWERS *American* DIVISION

PUBLIC UTILITY BODIES AND EQUIPMENT
McCABE-POWERS AUTO BODY COMPANY
HOME OFFICE: 5900 N. Broadway, St. Louis 15, Mo.
WESTERN OFFICE: Latham Square Building, Oakland 12, Calif.

CLIP THIS COUPON AND ATTACH TO YOUR LETTERHEAD

McCABE-POWERS AUTO BODY COMPANY • 428 Latham Sq. Bldg., Oakland 12, Calif.

Please send me details on the following:

SERIES 5510 REVOLVING AERIAL LADDER ( ) 23' 6" ( ) 26' 6" ( ) 30' 6"

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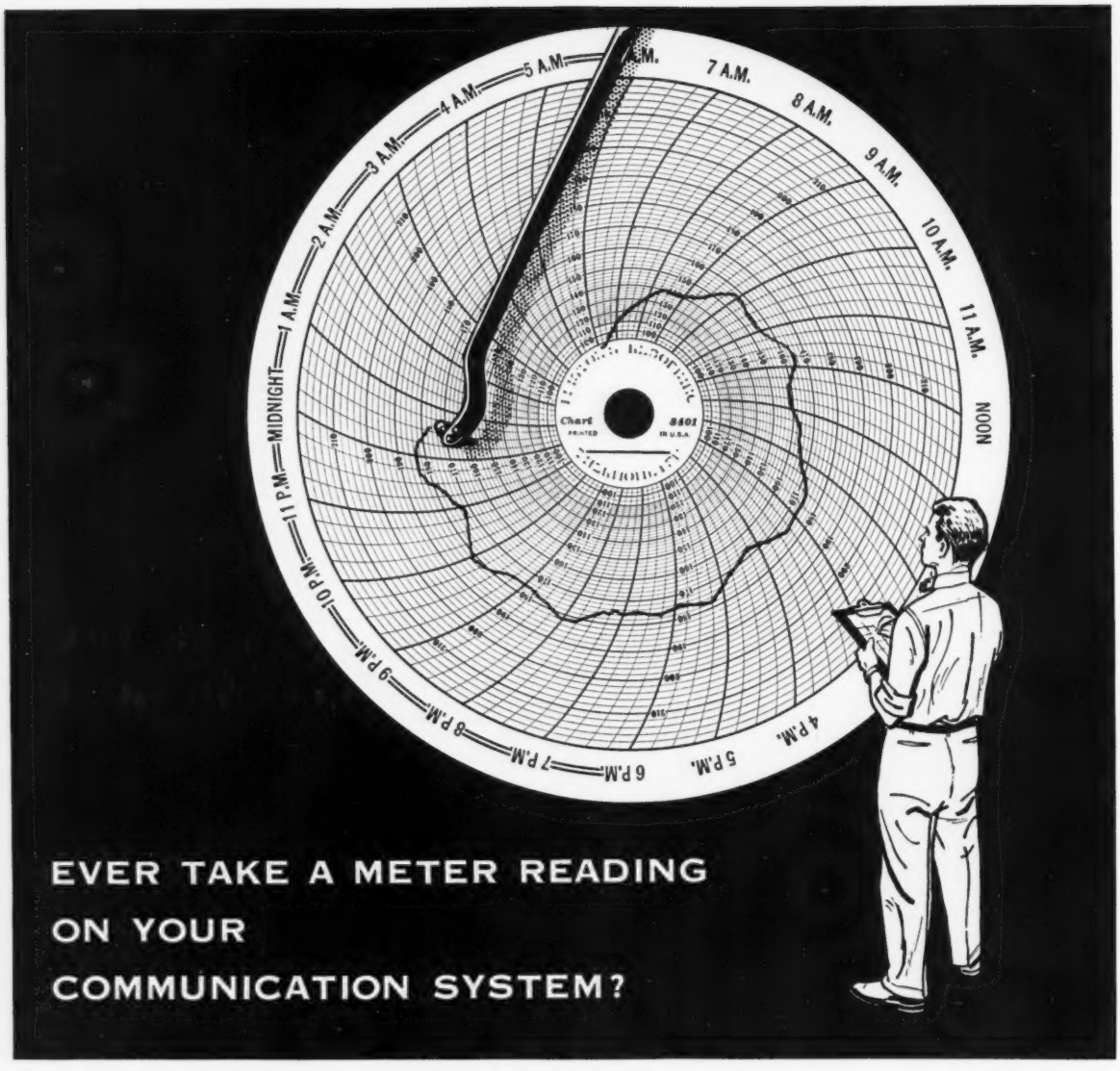
- ☐ General Service Bodies
- ☐ Light Duty Maintenance Bodies
- ☐ Wire Reels
- ☐ Pole Trailers
- ☐ Hydraulic Towers
- ☐ _____
- ☐ _____
- ☐ _____

Name_____

Company_____

Address_____

City_____ Zone_____ State_____



Bell System communication engineers will help you take a good, close look at your communication system . . . *at no cost to you.*

Your Bell Telephone Company will make a comprehensive survey to help you get the best use of your facilities . . . local exchange, long distance, mobile, teletypewriter, metering and supervisory control . . . all the communications you use. More than one hundred studies are now underway for major pipe lines, power companies and railroads.

These surveys include recommendations to give your operation the best communications at the lowest possible costs. Many companies have changed, rearranged or added services on the basis of these surveys.

• If you are interested in a communication survey by Bell System experts without charge, call your local Bell Telephone representative now.

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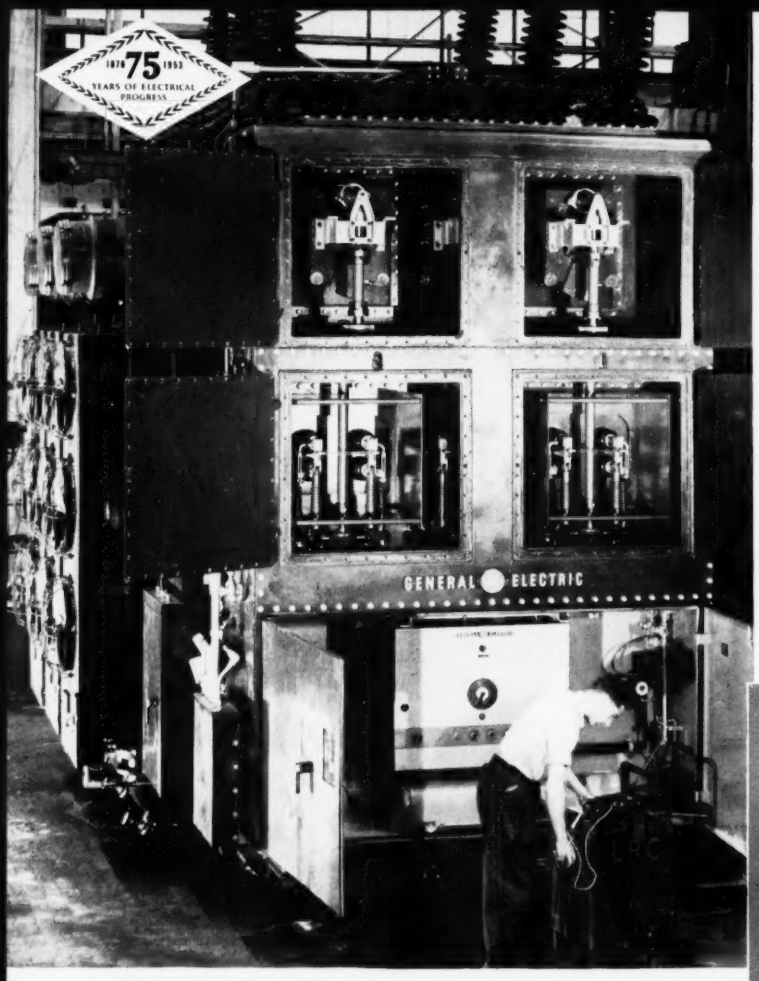
TELETYPEWRITER

MOBILE TELEPHONE

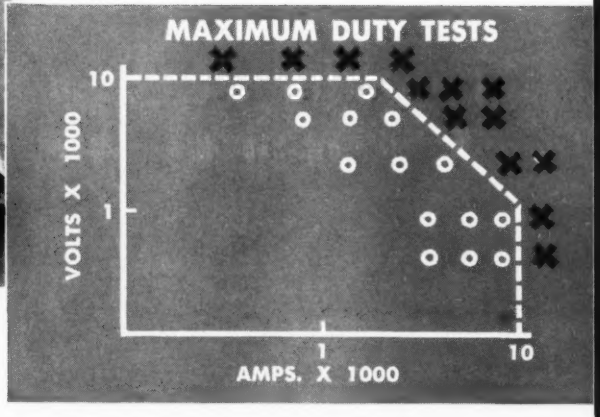
METERING CHANNELS

BELL TELEPHONE SYSTEM



FINAL TESTS on control wiring are made prior to shipment. Large, hinged doors, re-usable Nitrile rubber gaskets, and roomy compartments simplify field inspection and maintenance.

No need to worry if a short circuit occurs during a tap change



G-E Load-Ratio-Control operates successfully even under maximum short-circuit duty

If a system short circuit occurs while a tap change is under way, General Electric Load-Ratio-Control is designed to complete the operation successfully . . . *even under the maximum short-circuit duty to which the transformer may be subjected.*

Contactor interrupting tests, made during the design of each standard LRC mechanism, assure you of dependable operation. Oscillograms of each test shot record the current and voltage values and the arcing time. These points are plotted on a logarithmic chart like that shown above. Points showing excessive arcing time are recorded as crosses. Satisfactory tests are recorded as circles. A line enclosing area of satisfactory performance under short circuit defines the range of normal application of contactor.

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For full information on G-E Load-Ratio-Control, contact your nearest G-E Apparatus Sales Office, or write General Electric Company, Section 421-7, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

DISTRIBUTION TRANSFORMERS

different from others because.....

.....Strenicor pressure terminal clamps.....

minimize breakage due to stress-corrosion

Months or even years after installation, the strain imposed by tight connections may cause breakage of secondary terminals due to stress-corrosion (season cracking). This causes outages, service calls and customer inconvenience.

METALLURGICAL STUDIES of the causes of stress-corrosion led to the development of Strenicor—a new copper-nickel-silicon alloy. After successive solution and aging heat treatments, this alloy provides a high tensile strength of 107,000 psi—a yield strength of 83,000 psi. Thus General Electric Spirakore* transformers with Strenicor secondary terminals are practically immune to failure by stress-corrosion.

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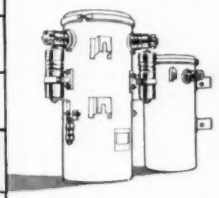
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	YES	NO	NO	NO	NO	NO
Nitrile rubber gaskets at all tank openings	YES	NO	NO	NO	NO	NO
Strenicor pressure terminal clamps	YES	NO	NO	NO	NO	NO
Insulated clamp-type connectors on tank wall hv bushings	YES	YES	YES	NO	YES	YES
One-piece cover band	YES	NO	NO	NO	NO	YES
Gapped valve-type arresters	YES	NO	NO	NO	NO	NO
Nationwide company-operated service facilities	YES	YES	NO	NO	NO	YES

1876 75 1951 YEARS OF ELECTRICAL PROGRESS



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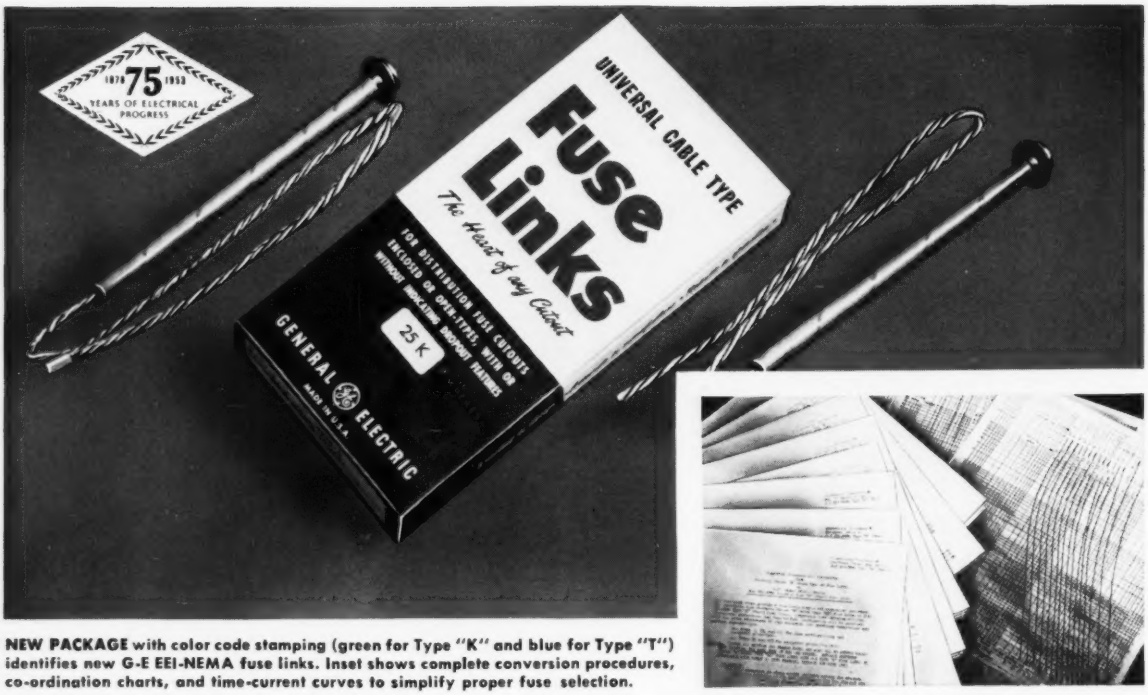

NEW PACKAGE with color code stamping (green for Type "K" and blue for Type "T") identifies new G-E EEI-NEMA fuse links. Inset shows complete conversion procedures, co-ordination charts, and time-current curves to simplify proper fuse selection.

G-E's new EEI-NEMA universal cable-type fuse links provide extra benefits from fuse link standardization

And it's Easy and Economical to Convert to G-E Standard Links

GENERAL ELECTRIC'S new EEI-NEMA standard fuse links not only meet all of the utility-sponsored EEI-NEMA requirements, but also offer many additional operating benefits. They provide both electrical and mechanical interchangeability . . . long desired by users . . . and there's a Type "K" (fast) and a Type "T" (slow) G-E standard link in both preferred and non-preferred ratings, for replacing practically any nonstandard links now in use.

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Extra-long auxiliary tube gives greater dependability for low fault currents, and better full-range operation of any cutout.

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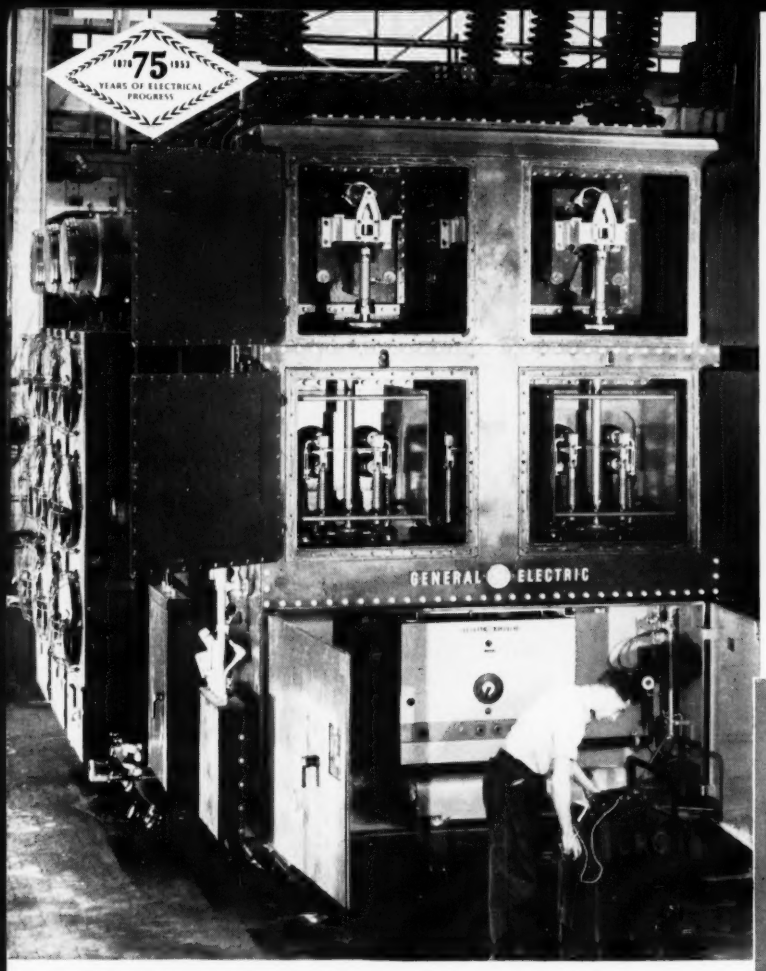

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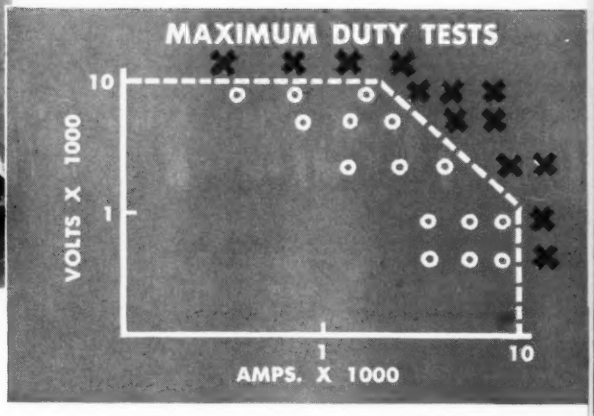

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DISTRIBUTION TRANSFORMERS

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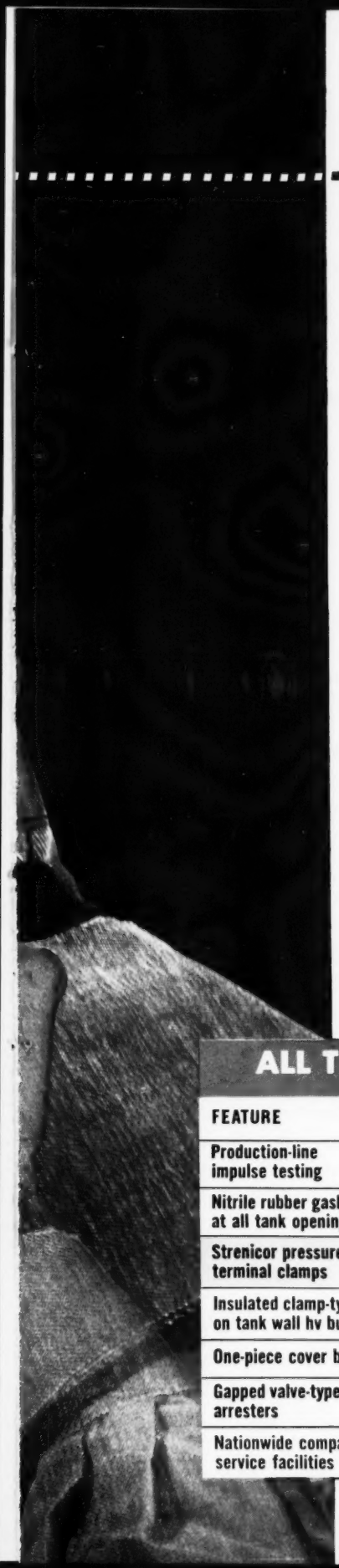

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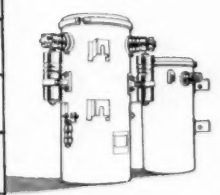
1878 75 1953 YEARS OF ELECTRICAL PROGRESS



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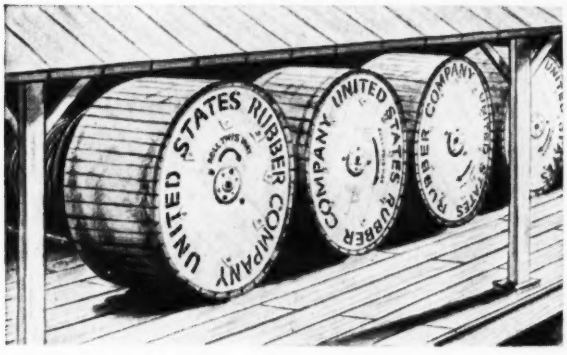
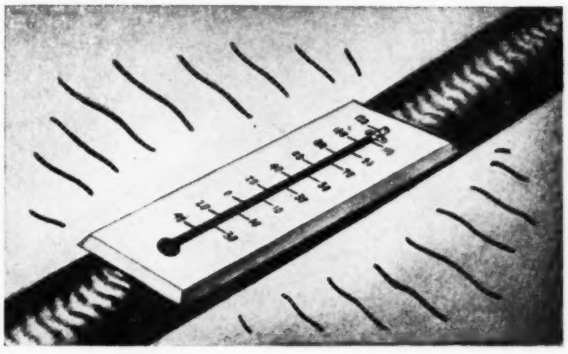
GENERAL ELECTRIC

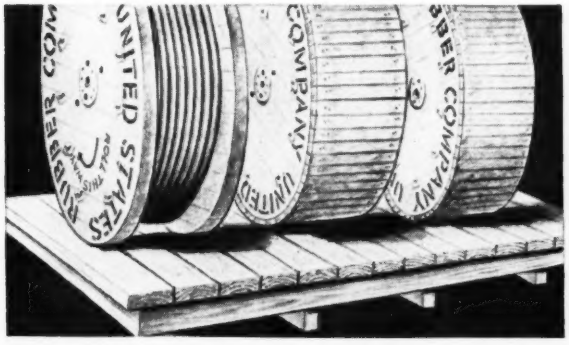
How to prolong the life of wire and cable by proper storage

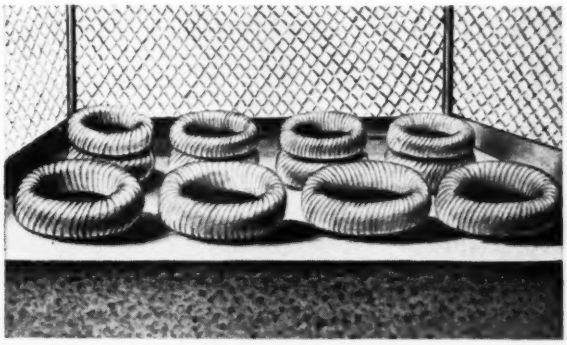




1 **Protect cables from the weather.** Moisture is especially injurious to fibrous coverings. When stored out-of-doors, if they become wet and then freeze, they will be weakened and the saturant will flake off. In humid weather, mold growth is accelerated, weakening the covering and making it easier to damage the cable during installation. (Rubber and thermoplastic insulated and jacketed cables may be stored under moderately humid conditions.) The larger sizes of fibrous covered and rubber jacketed cables and all lead-sheathed rubber insulated cables must be stored on reels which must be properly lagged—or the cable must be otherwise suitably protected against mechanical damage. Reels can be stored out-of-doors if the cable is protected against sun and weather, and the ends are properly sealed.

2 **Don't expose wires and cables to extremes of temperature.** Chemical reactions occur at a higher rate at high temperatures than low. The greatest deterioration of low-voltage cables is due to chemical changes, oxidation or internal changes in the compound itself. Never store reels in the boiler room unless you use a fan to blow hot air away from the wires and cables. It's best to store cables at room temperatures indoors out of direct sunlight. Rubber insulated cables may be stored and handled without damage at the lowest temperatures ordinarily encountered, but thermoplastic synthetic insulated cables should not be handled at temperatures below –10 C. (14 F.)





3 **Reels should be kept off the ground,** so that moisture will not harm the cables, reel flanges and lagging. Sound reels are easier to handle and there is less chance of injury to the cable as it is removed from the reel.

4 **Coils should be stored one layer deep on the floor or shelves,** with the axis either horizontal or vertical. To save space, they may be stacked, but not more than 5 coils in height—otherwise there is harmful pressure on the insulation. Don't remove brown paper or box that protects against dust and light until used.

5 **Rubber insulated fibrous covered, rubber jacketed or lead-sheathed cables in storage** should never be bent to a diameter less than I.P.C.E.A. recommended diameters. Never let coils or reels drop more than a few inches. Always roll a reel in the direction indicated by the arrow on the flange. When rolling an unlagged reel, put planks under the flanges to avoid pressure on the cable. Coils, reels and spools should always be rotated when wire and cable is removed to avoid twisting the cable.

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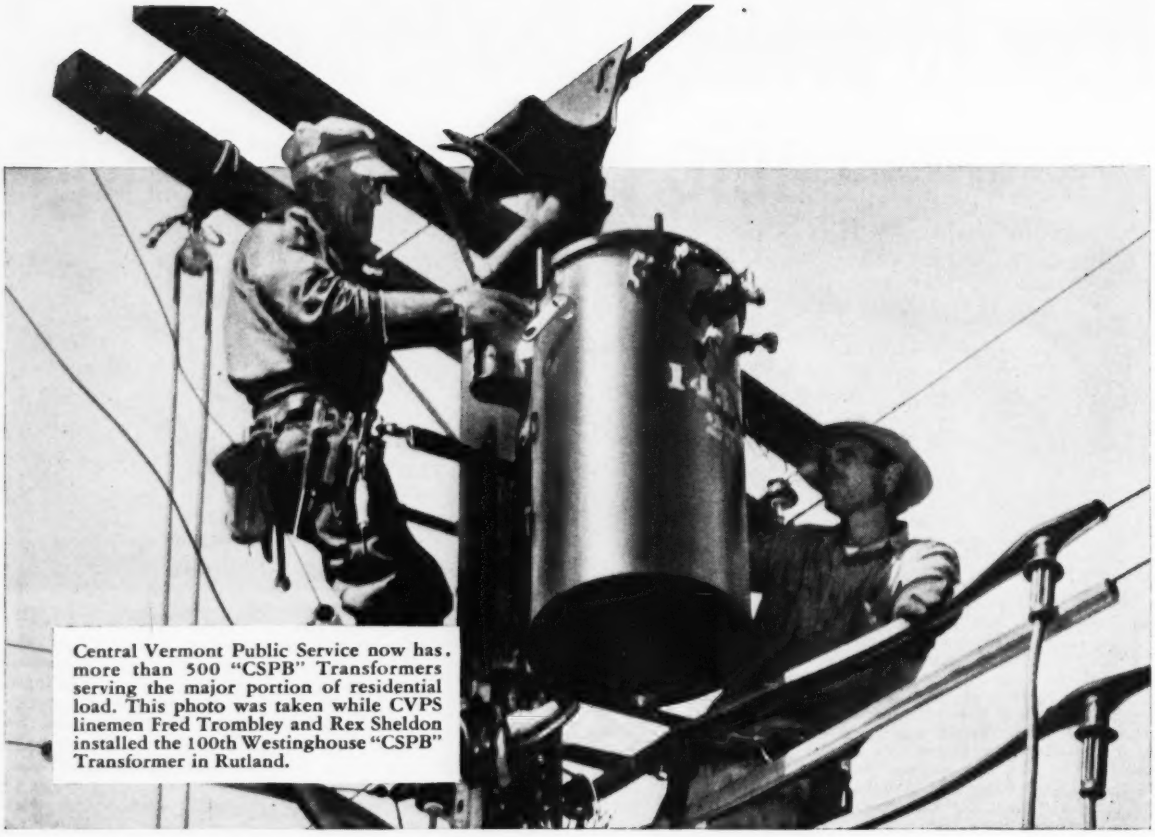
UNITED STATES RUBBER COMPANY

U.S. RUBBER
SERVING THROUGH SCIENCE

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK



Central Vermont Public Service now has more than 500 "CSPB" Transformers serving the major portion of residential load. This photo was taken while CVPS linemen Fred Trombley and Rex Sheldon installed the 100th Westinghouse "CSPB" Transformer in Rutland.

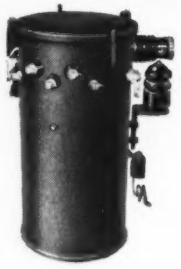
"CSPB®" Transformers take the heat off Rutland's load problem

Heavy loading of radial distribution made it necessary for Central Vermont Public Service to increase capacity at once. Future growth was certain.

They provided immediate capacity by banking with "CSPB" Transformers. Then, by simply changing to higher ratings, or adding more transformers, future growth could be handled economically.

For years, tying secondaries together has been recognized as providing the ultimate in transformer flexibility. But only with "CSPB" Transformers, first introduced by Westinghouse in 1946, can you eliminate the danger that sudden overloads or faults might cascade onto other transformers, and blank out the entire system. Here's why:

Two secondary breakers with warning signals function in each "CSPB" Transformer; one to serve each section of the secondaries. Secondaries are tied together only through the transformer. Therefore, "CSPB" Transformers first provide signal-light indication of a section operating at dangerous overload; then completely isolate severely overloaded or faulted sections...if that should become necessary to maintain service on the balance of the system.



Ask your Westinghouse representative for complete information, or write direct for Booklet B-4310A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70660-A

YOU CAN BE SURE...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Remember that Red Hot 1949 Briegel Combination Indenter and Fitting Deal? It broke all records then so here we go again!

For three months only, August, September and October, a Special Package Offer of 200-½" B. M. Couplings and 400-½" B. M. Connectors. Free of extra cost in this package will be 1 No. 606 Briegel ½" Indenter!

Stock up today with this Deal that sold out the last time it was offered.

BRIEGEL METHOD TOOL CO.

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For every Electrical need

CHECK General for ELECTRICAL

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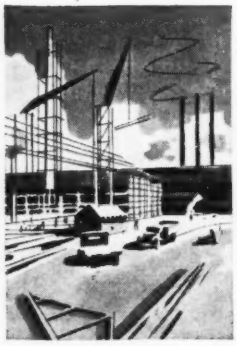
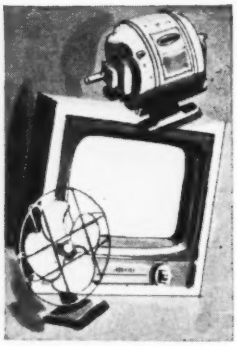
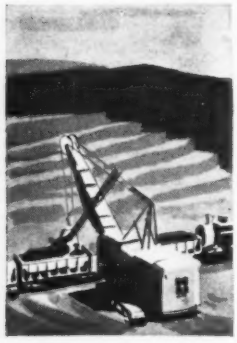


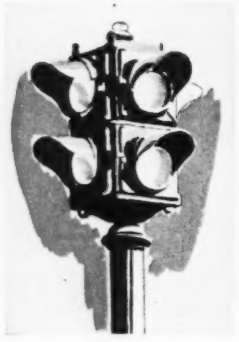
GENERAL INDUSTRY



MFRS. ELECTRICAL APPARATUS

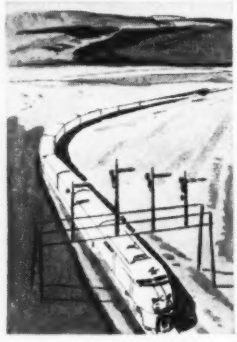


MINING-EARTH MOVING

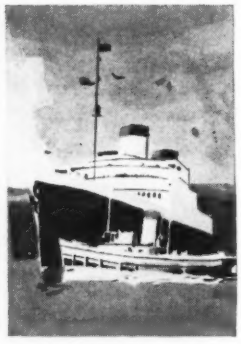


MUNICIPAL

POWER



RAILROADS



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Sales Offices in Principal Cities of the United States

Cable FIRST
WIRE and CABLE

Copper, bronze and aluminum conductors in thousands of different sizes and types of product. Constructions and insulations of every modern variety.

This is General Cable, a *prime source of supply* for everyone who generates electricity, distributes electricity or utilizes electricity.

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ONE Source of Complete Supply

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For Quicker Service Anywhere in the United States...General Cable maintains

22 Sales Offices

14 Resident Sales Representative Locations

Over **600** Distributor Sales Locations

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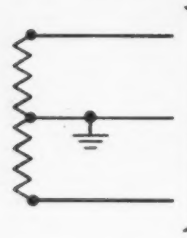
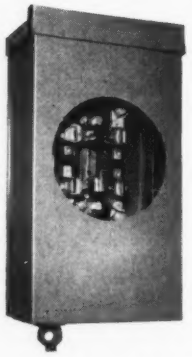
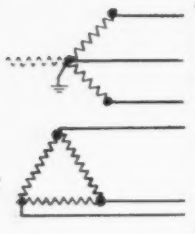
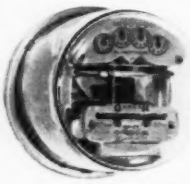
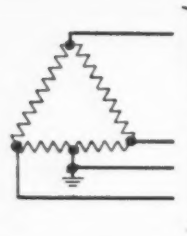
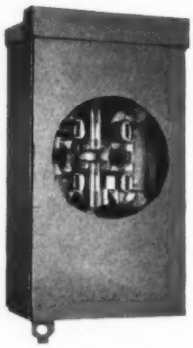
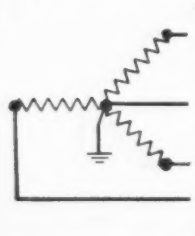
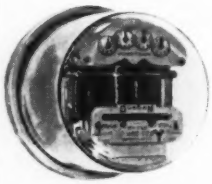
METERS for Tomorrow's Loads!

Industry figures show that total energy sales are approximately doubling every eight years. Meters that are adequate for today's loads must take these increases into account.

Duncan now has available a complete line of heavy duty metering equipment with adequate capacity to handle these increasing loads—both mounting devices and extended range socket type meters for continuous loads to 200-amperes.

SERVICE	EXTENDED RANGE METERS	HEAVY DUTY DEVICES
 single-phase, 3-wire	**TYPE MF-SE** 50-amp. 240-volt 3-wire 1-element	**TYPE HD-5**  For use with 4- or 5-terminal meters on 1-, 2-, or 3-phase, 3-wire services.
 2-or 3-phase, 3-wire	 **TYPE MH-2S** 50-amp. 120-, 240-, 480-volt 3-wire 2-element	
 3-phase, 4-wire delta	**TYPE MH-2SΔ** 50-amp. 240-volt 4-wire 2-element	**TYPE HD-7**  For use with 7-terminal meters on 3-phase, 4-wire services.
 3-phase, 4-wire wye	 **TYPE MH-2½S** 50-amp. 120-volt 4-wire 2-element	

"Designed for the Service!"

DUNCAN
WATTHOUR METERS

DUNCAN ELECTRIC MFG. CO.
LAFAYETTE INDIANA

Solenoid operated valves get extra-long life when . . .

HIGH-HEAT TAPE helps turn on the steam!

What makes "Scotch" Electrical Tape No. 27 ideal for high-heat insulating, holding or harnessing? Glass-cloth backing and thermosetting adhesive.

That's why Actown Manufacturing Co., Chicago, uses this tough tape on solenoid coils which electrically control valves manufactured by James P. Marsh Corporation, Skokie, Illinois. These valves are built to handle live steam, as well as all types of liquids and gases in refrigerating, processing and chemical handling.

They know the glass-cloth backing resists heat, will not stretch, shrink or rot. They know, too, that the thermosetting adhesive actually cures to a permanent bond in 1 hour at 300°F. After that, prolonged heat and moisture can do no harm.

Dependable insulation is vital on installations like this, as it is on *every* high-heat application.

Examine your high heat insulating requirements and keep a big supply of "Scotch" Electrical Tape No. 27 on hand for them. Be ready for the *hot* spots before they become *trouble* spots!

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**— also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

OIL CIRCUIT BREAKERS

NEW

Here's the inside story of recent improvements in this time-proved breaker. This breaker has long been used for outdoor distribution service where safe, reliable operation is a necessity. Now it is even more easily installed and maintained. This means a further reduction in your circuit breaker service costs because of the following features. A-4074

1. New "full view" doors open to expose three sides of operator cabinet—not just one.
2. Gasketed doors make cabinet completely weatherproof.
3. Cabinet is enlarged to house accelerating adjustment mechanism, solenoid operator and connecting linkage. Accelerating spring is easily accessible.
4. Simplified operator and pole unit mechanisms. Fewer parts now used for simplicity — added reliability.
5. Maintenance closing handle can be used from either front or side of control cabinet. This means breaker may be used in confined area.
6. Shielded vitreous enameled space heater provided.
7. Manual trip now located higher on back of cabinet to help prevent accidental tripping.
8. Simplified transformer wiring duct. Removal of single bottom plate of wiring duct exposes continuous transformer leads along full length of duct.
9. Self-aligning tulip and bayonet contacts retained.
10. Contacts are at convenient level — no interference from the frame.
11. Thoroughly proved *Ruptor* arc-interrupting device retained.
12. Easy tank removal! There is no interference from frame.
13. Individual rectangular tanks occupy less space, using less oil and providing best electrical clearances.
14. Tank lifter mounted on back — operated from either side.
15. Grounding pad is stainless steel faced.

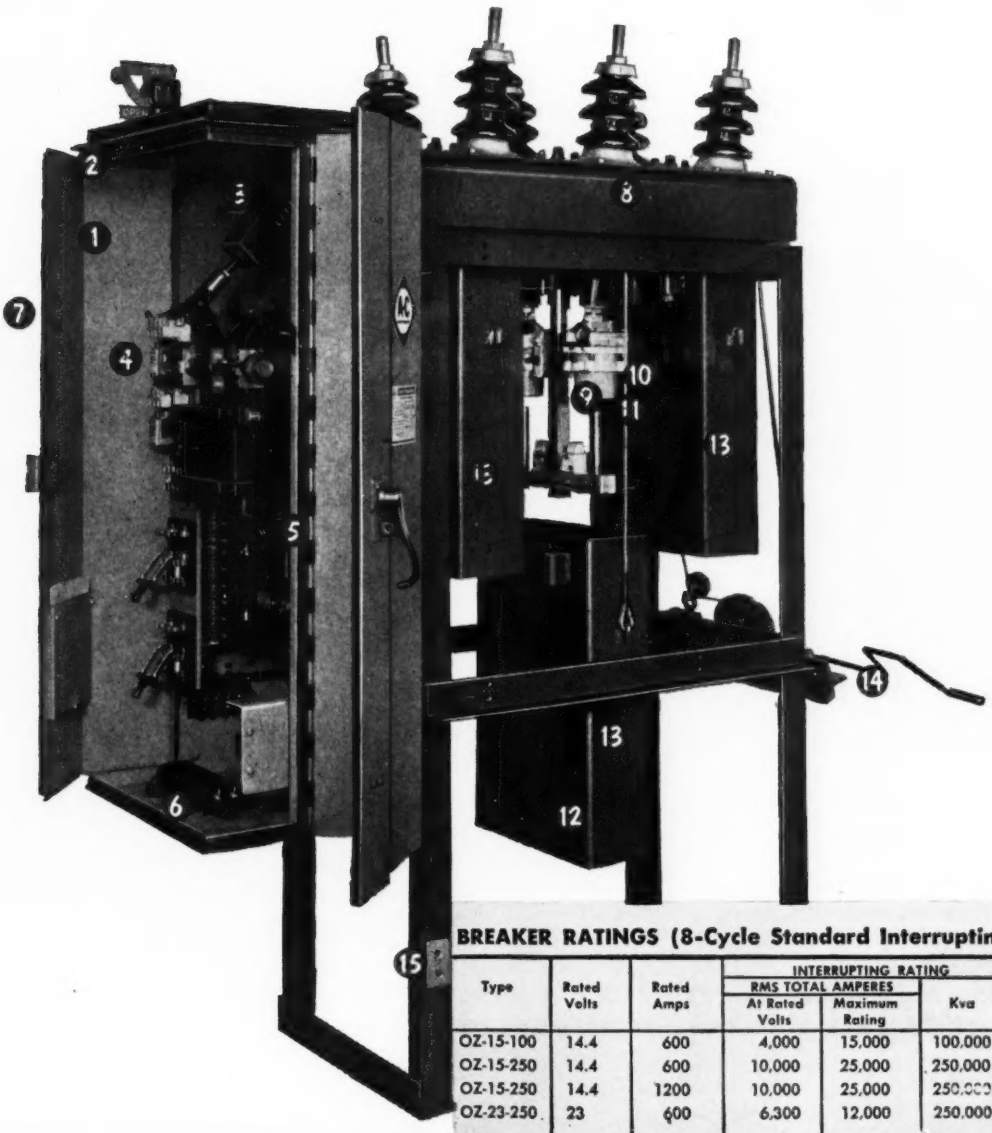
Standard outdoor automatic reclosing relay equipment and cabinet are available.

Ruptor is an Allis-Chalmers trademark.

ALLIS-

Accessibility

For Inspection...Test...Maintenance



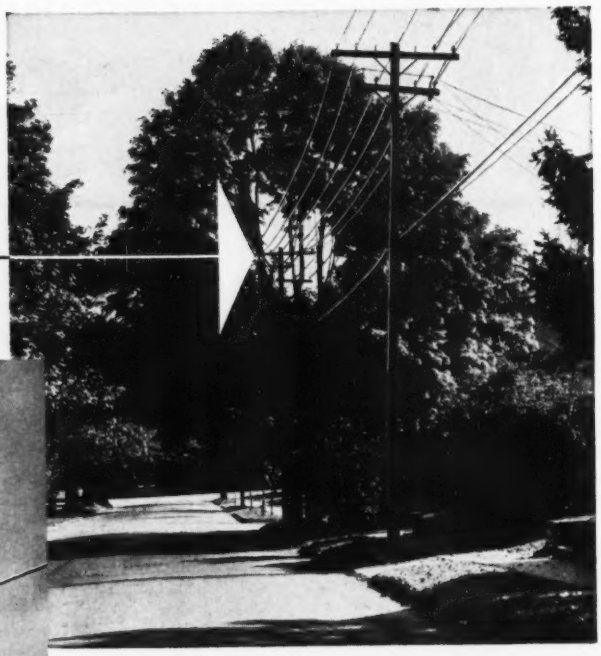
BREAKER RATINGS (8-Cycle Standard Interrupting Time)

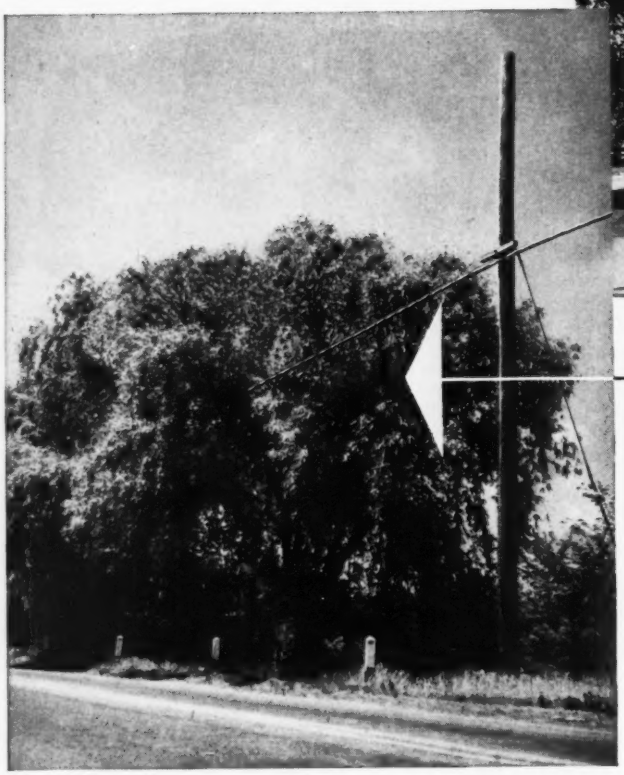
Type	Rated Volts	Rated Amps	INTERRUPTING RATING RMS TOTAL AMPERES At Rated Volts	INTERRUPTING RATING RMS TOTAL AMPERES Maximum Rating	INTERRUPTING RATING Kva	Weight of Breaker With Oil (lbs)
OZ-15-100	14.4	600	4,000	15,000	100,000	2,350
OZ-15-250	14.4	600	10,000	25,000	250,000	2,370
OZ-15-250	14.4	1200	10,000	25,000	250,000	2,470
OZ-23-250	23	600	6,300	12,000	250,000	2,370

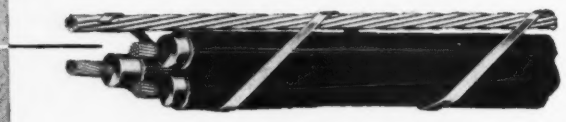
CHALMERS

A-C ALLIS-CHALMERS

Why trim trees like this







when you can use G-E Preassembled Aerial Cable

General Electric's Super Coronol* preassembled aerial cable fills the need for distribution circuits up to 15 kv where appearance, safety, and service continuity are desired at a reasonable cost, and where underground construction is not warranted. Along tree-lined streets in particular, G-E aerial cable has given outstanding service and has largely eliminated the cost and ill-will resulting from tree trimming.

The record of hundreds of installations shows that G-E aerial cable will stay in service when wind, snow, ice, and falling trees place open wire in trouble. In some cases where the pole plant was down, G-E preassembled aerial cable continued to operate satisfactorily even while lying on the ground.

For more information see your General Electric Wire and Cable specialist, or write Section W65-825, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

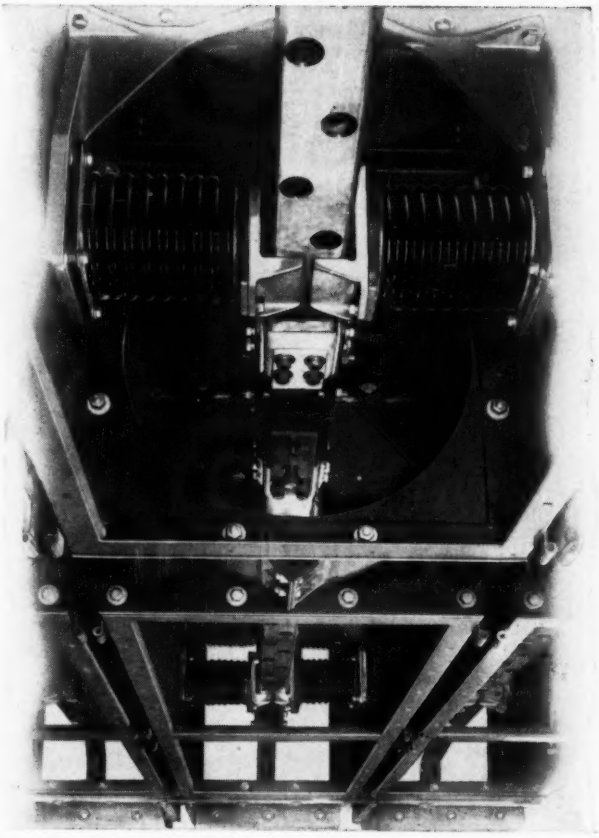
You can put your confidence in—

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

GENERAL ELECTRIC

ROLLER SMITH ELPECO

METAL-ENCLOSED BUS



IS *Pre-assembled*

Ease of installation is one of the outstanding features of all ELPECO bus. Each structure is completely assembled at the factory—then shipped to you in convenient-to-handle, easy-to-install sections.

Because each shipping section is a complete factory assembled unit, including hangers, you are assured of a perfect final installation with a minimum expenditure of time, effort and money.

ELPECO bus structures are available in Non-Segregated Phase, Segregated Phase and Isolated Phase types—for indoor and outdoor uses—designed and constructed to conform to N.E.M.A. standards—furnished in all ratings of 600 volts to 34.5 kilovolts and 600 to 7000 amperes.

For full information write for Catalog 5100.

ELPECO DIVISION
ROLLER-SMITH CORPORATION
BETHLEHEM PENNA.

CLARK CONTROL CENTERS

are *easier to install* easier to service easier to add to, or alter

Centralized grouping of motor control contributes to efficient operation of many modern industrial plants. *CONTROL CENTERS* by *CLARK* have many features that provide the maximum benefits obtainable. For example:

Separately enclosed 6-inch wide vertical wireways for each vertical section are accessible without opening compartment doors. This feature means easier installation and maintenance.

Safe-edge compartment doors eliminate dangerous sharp edges and corners. Door handles are interlocked with disconnect switches or circuit breakers.

Frame is rigidly constructed in double-box style, of sturdy welded channel sections, capable of withstanding heavy blows without destroying alignment.

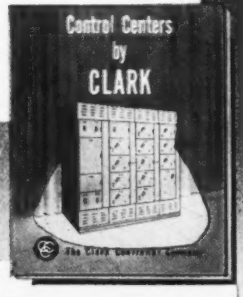
All Control Equipment is accessible and removable from front. Connections and wiring are all done from the front, and all equipment is accessible without removal from compartment.

Each compartment is an integral unit, independent from frame and, in practically all sizes, is completely removable, with plug-in connections. This provides maximum flexibility.

Uniform neat appearance of compartments, in a complete range of sizes, permits an almost infinite variety of combinations.

In NEMA Type C construction, Clark Control Centers permit terminals to be located in top and/or bottom or in vertical wireways.

The use of standard factory-assembled components throughout eliminates special engineering, saves time and money in installations.



CONTROL CENTERS by CLARK, are completely CLARK designed, CLARK engineered and CLARK built, for continuing reliability and uniformity.

Send request on your company letterhead for your copy of this factual book, now in preparation.

ENGINEERED ELECTRICAL CONTROL

THE CLARK CONTROLLER CO.

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Lost your shirt on hidden lighting cost?

Don't let it happen again.
Buy the QUALITY line with "plus"
values on the price tag.

SIMPLIFIED INSTALLATION EFFICIENCY
SOUND ENGINEERING
EASY MAINTENANCE DEPENDABILITY

Remember . . . You get only what you pay for . . . and buying on price alone can be costly.

Next time look to..... SMOOT-HOLMAN .....for quality

CONTROLLING STREET LIGHTS at Levittown with FISHER-PIERCE PHOTOELECTRIC CONTROLS

THE FISHER-PIERCE SERIES 6330OC
The latest unit in a proven line of photoelectric controls for street lighting

To protect the citizens of the great new Levittown, "Delaware Valley, U. S. A.," which will be Pennsylvania's tenth largest city when completed, Philadelphia Electric Company chose Fisher-Pierce Photoelectric Controls for positive all-season control of street lighting. The *instant* that daylight falls below a safe level in Levittown, F-P Controls automatically turn street lights on, regardless of time of day, season, or weather conditions.

Fisher-Pierce maintains leadership in photoelectric street lighting control because each F-P unit is built to meet the rigid standards of reliability and quality demanded by utility engineers. For eight years, F-P Controls have been proven in use by hundreds of utilities in thousands of installations.

If you are considering modernizing your street lighting or are concerned with street lighting problems, consider the Fisher-Pierce Photoelectric Control.

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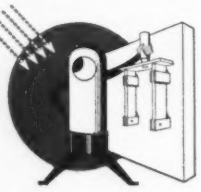


The FISHER-PIERCE CO., Inc.
43 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.

ELECTRICAL BOOKS

VACUUM-TUBE OSCILLATORS, by William A. Edson, 476 pages, 6x9, John Wiley & Sons Inc., $7.50. This book presents a systematic treatment of the many factors that affect the behavior of vacuum-tube oscillators, using the viewpoint of design rather than analysis. Mathematics have been employed where helpful. It is directed toward the graduate of electrical engineering as a guidance for practicing engineers, or as a senior or graduate course. Abbreviations, symbols, etc., conform to the standards of the Institute of Radio Engineers.

SERVOMECHANISM ANALYSIS, by George J. Thaler and Robert G. Brown, 414 pages, 6x9, McGraw-Hill Book Co. Inc., $7.50. This text presents the essentials of the mathematical theory of servomechanisms, stressing the elements of analysis as being a necessary preliminary to design. Included in the mathematical methods for analyzing servo systems are discussions of transient analysis, polar transfer function, logarithmic transfer function analysis. Use is made of physical explanations and worked examples following the mathematical development. Special features in line with recent developments in servo theory include discussions of relay servomechanisms and the Root Locus method.

PRINCIPLES OF ALTERNATING-CURRENT MACHINERY, fourth edition, by Ralph R. Lawrence, revised by Henry E. Richards, 623 pages, 6x9, McGraw-Hill Book Co. Inc., $7.50. Retaining same form, scope and general treatment as before, this major revision brings the subject matter up to date to include new advances and changes in the field. It provides an analysis of operation and characteristics of transformers, synchronous generators, motors and converters, polyphase and single-phase induction motors, series and repulsion motors, induction generators and mercury-arc rectifiers. A senior course, it is designed to give the student an understanding of the way each machine works and the reasons for special characteristics.

ELECTRIC CONTROL SYSTEMS, third edition, by Richard W. Jones, 511 pages, 6x9, John Wiley & Sons Inc., $7.75. This edition integrates the subjects of machinery, electronics, circuits and transients; uses analysis and graphical methods to develop basic ideas; introduces Boolean algebra for the purpose of developing fundamental aspects of relay switching networks, considering relay and electronic counting circuits; treats power amplifiers and the dynamoelectric and magnetic types; includes the fundamental concepts involved in the study of feedback controllers; includes an extensive bibliography.

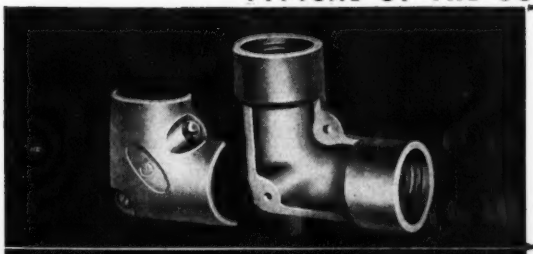
HIDDEN THREADS OF HISTORY: Wilson through Roosevelt, by Louis B. Wehle, 300 pages, 6x9, The Macmillan Co., $4. Drawing from wide experience in business and public affairs, the author gives lively and clear accounts, with new disclosures, of pivotal happenings in and between the two world wars. Chapters XIV through XVII deal specifically with hydroelectric power in Tennessee and the Northwest.

FOR CORNER PULL-IN ELBOWS, 3-PIECE CONDUIT COUPLINGS, PIPE STRAPS—CLAMP BACKS—NEST BACKS

GEDNEY *ALWAYS!*

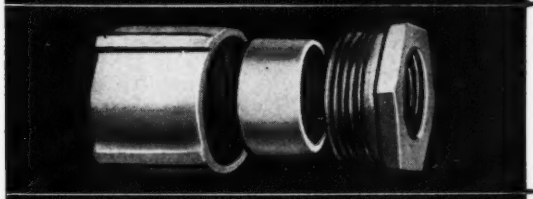
NATURALLY you want to cut installation time and costs. And you'll do it easily with Gedney Fittings, for these fittings are accurately machined and threaded, smooth finished, individually inspected to ensure top quality. What's more, Gedney Fittings are made of unbreakable malleable iron. For best profits, order Gedney always!

TYPICAL OF THE COMPLETE GEDNEY LINE ARE:



Corner Pull-In Elbows in ½", ¾" and 1" sizes. Ideal for space-saving, machine wiring, easy wire pulling. Cadmium plated.

Now available in 1¼", 1½" and 2" sizes



3-Piece Conduit Couplings in a large range of sizes from ½" to 6". Cadmium plated.

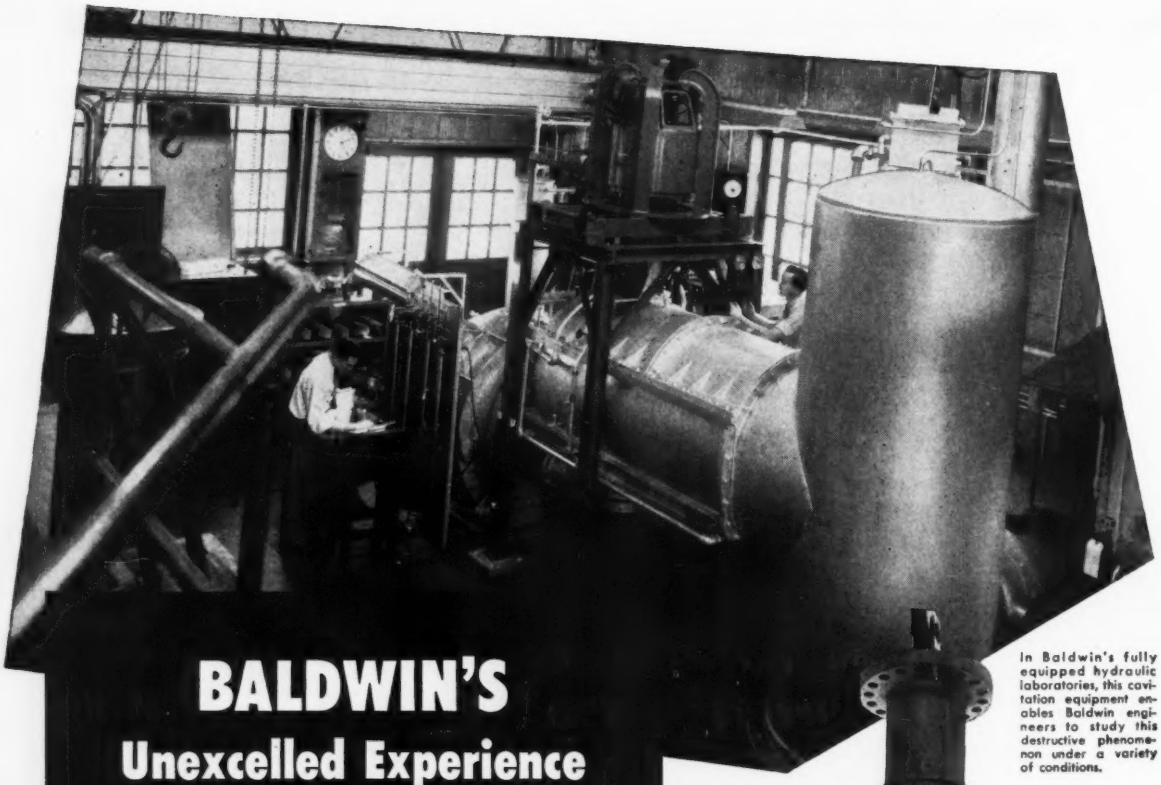
One-Hole Pipe Straps, Clamp Backs, and the handy new Gedney Nest Backs. These supplementary spacers nest firmly behind the Clamp Backs — use as many as you need to hold pipe at desired distance from wall. Hot dip galvanized to prevent corrosion.

GEDNEY FITTINGS FIT

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.



BALDWIN'S
Unexcelled Experience and Research Pay Off Again With 94% Efficiency of Center Hill Turbines

In Baldwin's fully equipped hydraulic laboratories, this cavitation equipment enables Baldwin engineers to study this destructive phenomenon under a variety of conditions.

Here is the one-piece, 127,200 lb., 186⅛ in. runner for the Baldwin 62,500 hp Francis-type turbine at Center Hill and Wolf Creek Dams.

Baldwin's continuing research, combined with experience in designing and building all types of turbines from as early as 1825, is paying a big dividend to the Corps of Engineers at its Center Hill and Wolf Creek Dams.

Initial tests of one of three 62,500 hp vertical Francis-type turbines at Center Hill showed a maximum attained efficiency (at 105.9 rpm and 160 foot head) of 94% . . . one of the best efficiency records ever obtained for Francis-type units. Since the six Baldwin-built turbines for Wolf Creek are identical, the Corps of Engineers has the benefit of similar high efficiency for its two Cumberland River Valley hydro-electric plants which will generate about 1218 million kwhr each year.

Whatever your hydro-electric project, Baldwin engineers will be glad to put their vast experience and resources at your service to help you get top performance. Experienced with all four basic type of turbines . . . Francis, Kaplan, Pelton Impulse and Propeller . . . they can give you an unbiased opinion of the type best suited to your flow and head conditions.

For details about Baldwin research and some interesting turbine installations, please write for Bulletin 1000 to Department 5153, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.

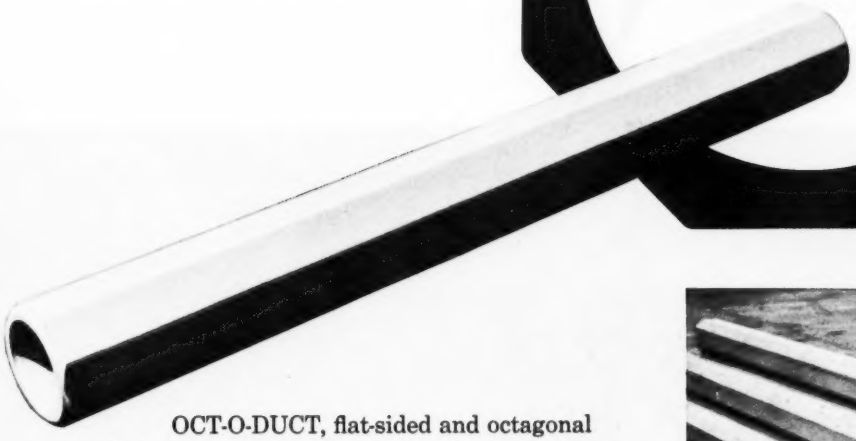
BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities

Engineered for better circuit protection to save you money

New SOAPSTONE OCT-O-DUCT



OCT-O-DUCT, flat-sided and octagonal in design, cuts field costs on handling, spacing and alignment in the trench.

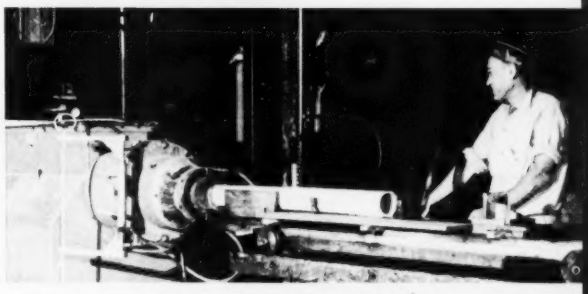
OCT-O-DUCT, thanks to new manufacturing methods and machinery, is even stronger, smoother and more homogeneous than the former Soapstone round duct which has long been the Western standard.

OCT-O-DUCT has been thoroughly field-tested and now carries the approval of leading Western utilities for both power and communication circuits.

OCT-O-DUCT is manufactured in a full range of sizes from 2″ to 5″ and is available, together with a complete line of fittings, for immediate delivery to trench-side in most of California.

OCT-O-DUCT continues the Soapstone tradition of having the lowest delivered cost of any underground conduit of comparable quality.

The flat-sided construction of OCT-O-DUCT is the key to many money-saving features: easier stacking and handling in storage; faster, cheaper spacing; easier handling and alignment in the trench.



Here's why the electrical, chemical and mechanical characteristics of OCT-O-DUCT are better. Powerful new extrusion presses, specially designed for Soapstone, turn out a smoother, stronger more homogeneous conduit. Smooth Soapstone has always been easiest on cables. Chemically inert, it dissipates heat rapidly and will not form slag or fuse with arcing cables.

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, California • Factory: 3985 Beach St., Oakland, California

Distributed in the West By MAYDWELL & HARTZELL, INC.

San Francisco · Los Angeles · Phoenix · Portland · Seattle · Spokane

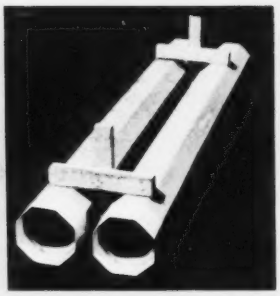
MANUFACTURERS OF UNDERGROUND CONDUIT FOR OVER 25 YEARS

Check these

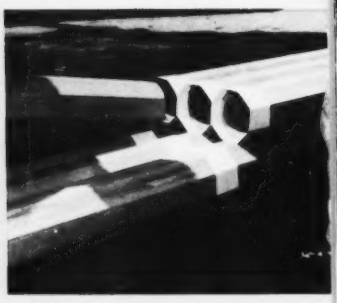
field advantages of

New SOAPSTONE OCT-O-DUCT

Standard bends (90°, 45°, and 11¼°) can be cut with a hand saw to fabricate any degree bend in the field. Cast-iron adapters and standard pipe fittings combine to easily join OCT-O-DUCT to other sizes and types of conduit. Flared, protective bell-ends are also available.



No need to pay for special, heavy and expensive spacers when you use OCT-O-DUCT. Treated-wood type spacers shown here make spacing cheap and easy. Available in any desired combination of vertical and horizontal separation. Or use common bricks or flat concrete strips.



Where no conduit spacing is needed, as is usually the case in communication circuits, OCT-O-DUCT stacks easily, up to 24 high if desired. Sturdy wax-impregnated paper collar lays flat and snug, does not interfere with alignment of ways.

Workmen in the field carry plenty of the wax-impregnated collar-type couplings right in their pockets. Collars come folded flat, slide easily but snugly over beveled end of OCT-O-DUCT to hold conduit in line, keep out soupy aggregates during concrete pouring.

The object of burying a power or communication circuit underground is to protect the circuit against physical damage and to assure permanent functioning. The conduit used usually represents no more than 10% of the cost of the underground duct system. But the conduit used affects much of the other 90%.

Speed of laying, availability in the quantities and sizes you need, delivery to the job, a smooth bore to reduce cable wear and speed pulling, the right electrical, chemical and mechanical characteristics are all important conduit factors that affect the total cost.

Soapstone conduit has proved to be outstanding in all these respects and many more. For over 25 years it has been proving this to electric utilities, telephone companies, electric and underground contractors, Army, Navy, Air Force and industrial plants in the Western U. S. and overseas.

SOAPSTONE DUCT COMPANY

110 Linfield Drive, Menlo Park, Calif. • Factory: Oakland, Calif.

Distributed in the West by Maydwell & Hartzell, Inc.

San Francisco · Los Angeles · Phoenix · Portland · Seattle · Spokane

SOAPSTONE SUPERIOR CONDUIT • PERMANENT CIRCUIT PROTECTION

Responsibility...

and a river to cross

Most transmission line spans are routine for Louisiana Power and Light Company. But the broad Mississippi called for a 3850-ft main span, two 1000-ft anchor spans and high water clearance of 150 ft over a busy ship channel.

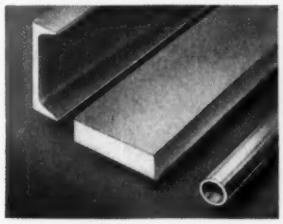
Alcoa, called in for consultation, designed and manufactured special ACSR to meet the exacting requirements of conductance and tensile strength. Furthermore, conductors were ordered in the accurate lengths required to give specified sags in each span. Cable length determinations for this double circuit crossing involved calculations by experts. Dead-end fittings were applied to each length at the mill before shipment to the job. When pulled up into position, these conductors fitted perfectly.

Unusual service? Not for Alcoa. We co-operate readily because we believe that the best installations are just as important as the best products. This is your guarantee of satisfaction with Alcoa Aluminum Electrical Conductors. Aluminum Company of America, 2103-H Alcoa Building, Pittsburgh 19, Pa.

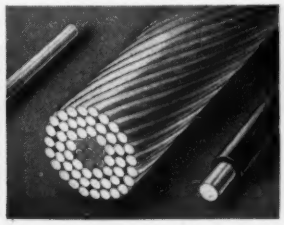
Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

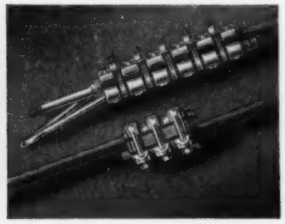
Alcoa Aluminum Bus is available in rectangular and solid round bars, channels and tubular shapes.



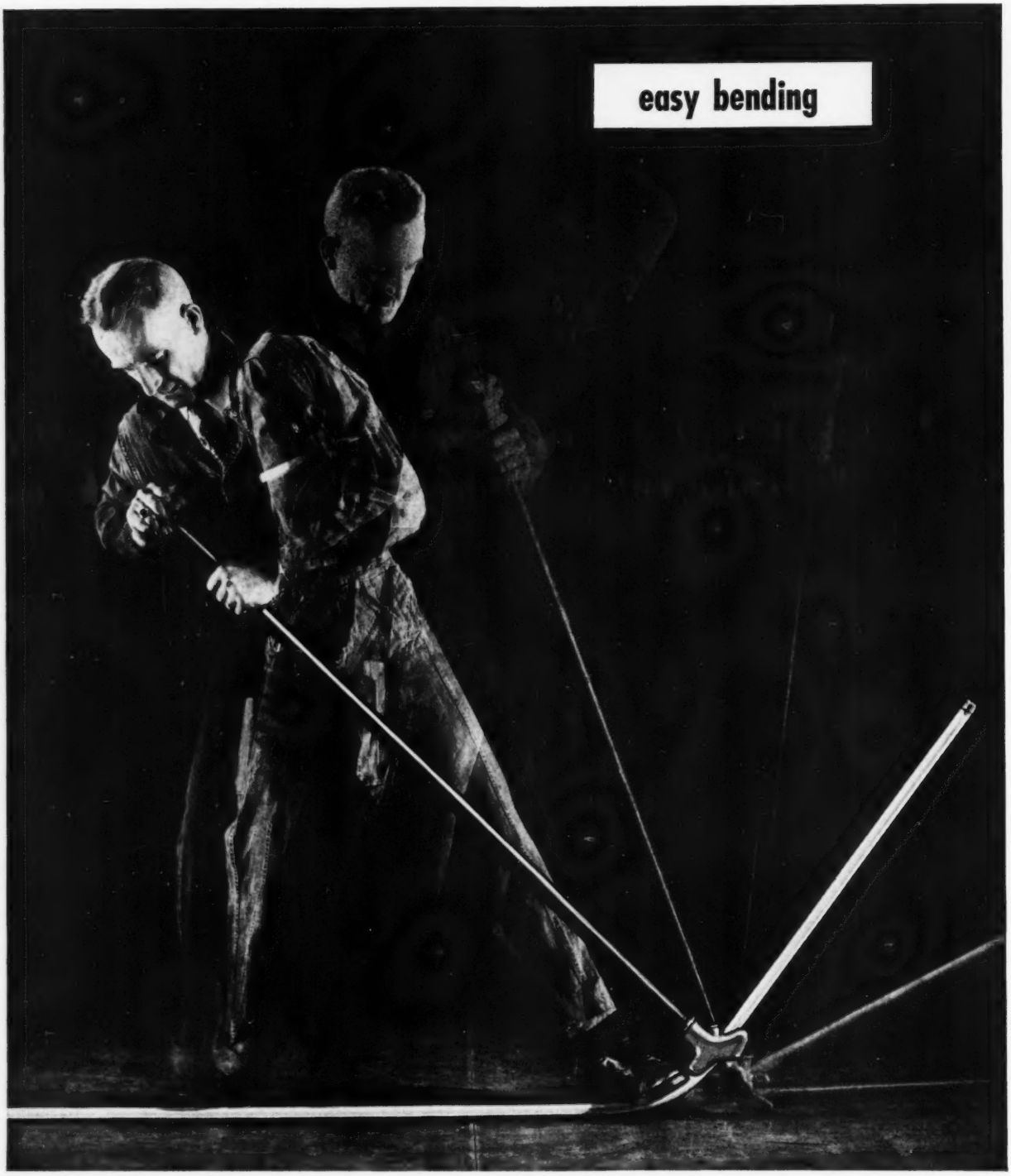
Alcoa Aluminum Electrical Conductors include ACSR, solid and stranded aluminum wire, bare or covered.



Alcoa's full line of aluminum accessories, is correctly designed for use with all aluminum conductors.



G. E. announces



New G-E WHITE is easier to bend because the "metallizing" process eliminates the quenching and straightening that cause hardening.

new rigid conduit

Wire-pulling is easier because new G-E WHITE is lined with a new corrosion-resistant coating, containing an anti-friction agent. There is no roughness inside the conduit that might damage insulation.

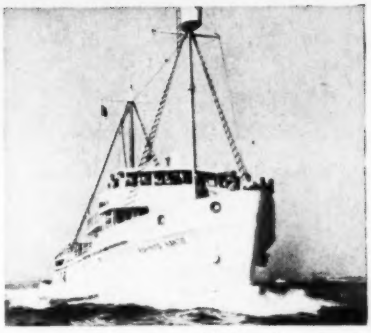
A new G-E WHITE rigid steel conduit that has easy bending, easy wire-pulling, and improved corrosion-resistance characteristics has been introduced by General Electric's Construction Materials Division.

The result of an intensive research and development program, new G-E WHITE is now zinc-coated by means of a process called "metallizing." This process, while never before applied to rigid conduit, has been proved by more than 30 years of use on ships, pipelines, bridges, and trestles in damp and corrosive atmospheres.

In metallizing, pure zinc powder, reduced to a plastic state, is sprayed onto the conduit. This bonds a controlled, uniform coating of pure zinc to both pipe and threads to provide lasting protection against corrosion. Metallizing does not harden the conduit or form brittle zinc-iron alloy.

In addition to the metallizing process, a new anti-friction inside coating has been added to make wire-pulling easy . . . to provide permanent interior protection against corrosion.

The new G-E WHITE rigid conduit conforms with the American Standards Association specifications, is listed by Underwriters' Laboratories, Inc., and meets all U. S. Government specifications. Ask your distributor about the new G-E WHITE. Available in all size mixes. Section C24-825, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



Photograph courtesy of Metallizing Engineering Co., Inc.

Better Corrosion Protection—The corrosion resistance of metallizing has been proved by 30 years of service, and by exhaustive tests in G-E laboratories. The hull and superstructure of the ship above depend on metallizing for protection against salt spray. The new G-E WHITE conduit has the added protection of a coating of C-553 lacquer over the metallized zinc.

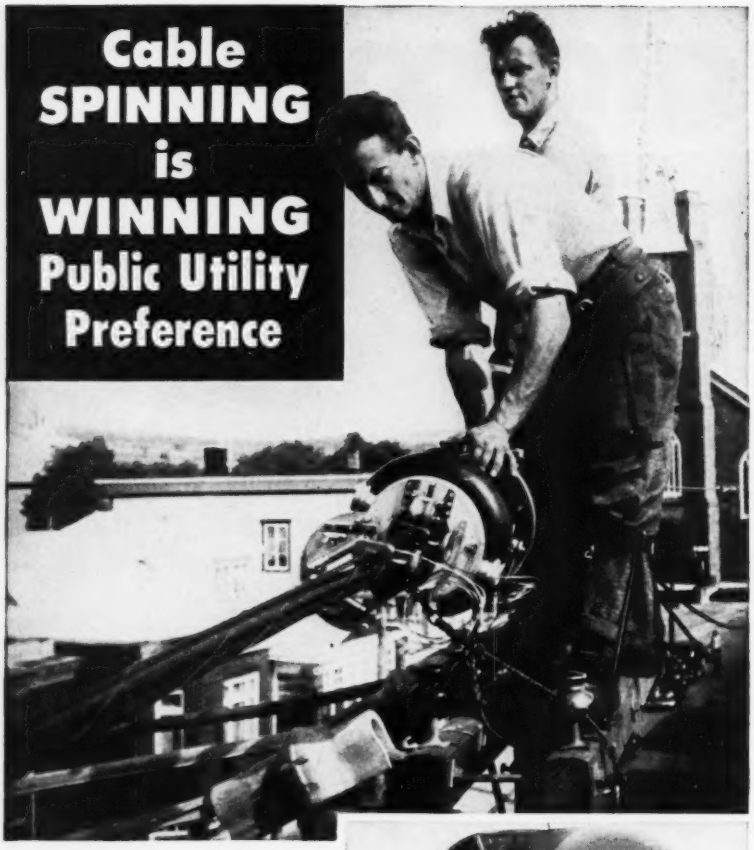
New G-E WHITE

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

You can put your confidence in—

GENERAL ELECTRIC

Cable SPINNING is WINNING Public Utility Preference



More and more public utilities every day are turning to the Neale Model "K" Cable Spinner—specially designed for economical and efficient power line use. And here are some of the benefits . . .

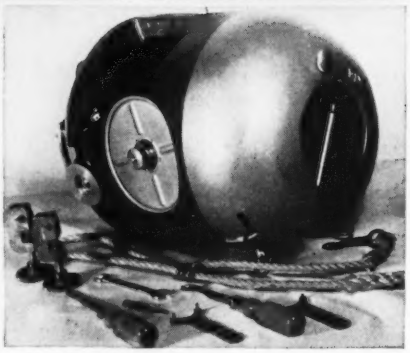
It actually costs much less to install spun cable than pre-assembled cable. And, of course, spun cable saves valuable space in open-wire construction in congested areas.

Light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables . . . to save splices and installation labor.

Spinning reduces cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

Cable spinning provides a big margin of extra protection against storm damage ... and has proved invaluable in emergencies of all kinds.

You're invited to send for full technical details on the Neale Model "K". Just drop a line to Cable Spinning, Topeka. *Neale Spinning Wires available in seven different types and sizes.*



Main illustration shows spinning of cable in Canada. Inset is close-up of the Neale Model "K" Cable Spinner, with accessory tools. Model "K" spins a single cable or three 2" cables into a compact triangular pattern. Strand lies in groove formed by two top cables.

HOW IT WORKS. Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13" of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, spaced to spiral 6½" apart for ample cable support. Magnesium castings used wherever possible for lightness and strength. Weight is only 36 pounds. Length 18½", 12" diameter, 4¾" wire exit.

THE WORLD IS SPINNING—TOO! PHONE 2-7234-5

Cable Spinning Equipment Co.

3100 TOPEKA AVE. TOPEKA, KANSAS

LETTERS TO THE EDITOR

To the Editor:

I would like to address an open letter for publication in ELECTRICAL WEST to all electrical connector manufacturers and to all users of electrical connectors.

I think it will be agreed that the various names by which the many materials or compounds that are applied to a conductor and/or connector to improve or stabilize the electrical circuit at that point are not descriptive of their functions, are many times misleading and are far from standardized in usage.

Such terms as protective compound, inhibiting compound, connector compound, connector "goop," etc., can be heard at both technical meetings and on pole tops and appear abundantly in our technical literature. They are both confusing and inadequate in my opinion and it is high time that the industry make an attempt to standardize a properly descriptive set of terms by which any type or kind of connector aid manufactured can be accurately classified.

I herewith propose such a set of descriptive designations for appraisal by those who are interested in this problem. My proposal has merit, I believe, however the designations given may be improved upon, I am sure.

Connector aids:

(1) **Sealing Paste:** A jell-like paste to keep air and moisture, etc., out of the contact area. Examples: Neutral greases, heavy bodied jells, extensible films, etc.

(2) **Contact Aid:** Metallic grit in a light vehicle, field sprayed metallic surfaces, active etching preparations, etc.

(3) **Sealing-Contact Paste:** Providing a combination of the functions of (1) and (2) above. Example: A metallic, cutting particle incorporated into a heavy bodied neutral grease or other extensible medium.

(4) **Coverall:** An enclosure over the entire finished connection. Examples: Molded on plastic covers; self-sealing, hand-applied mastic compounds; tape; sprayed on films, etc.

E. W. GREENFIELD
Head, Electrical Engineering Department
Kaiser Aluminum & Chemical Corp.
Spokane, Wash.

To the Editor:

Most electric utilities seem to have found it necessary to put into effect higher rates to compensate for higher taxes, pay roll, power, materials, equipment and other inflated costs.

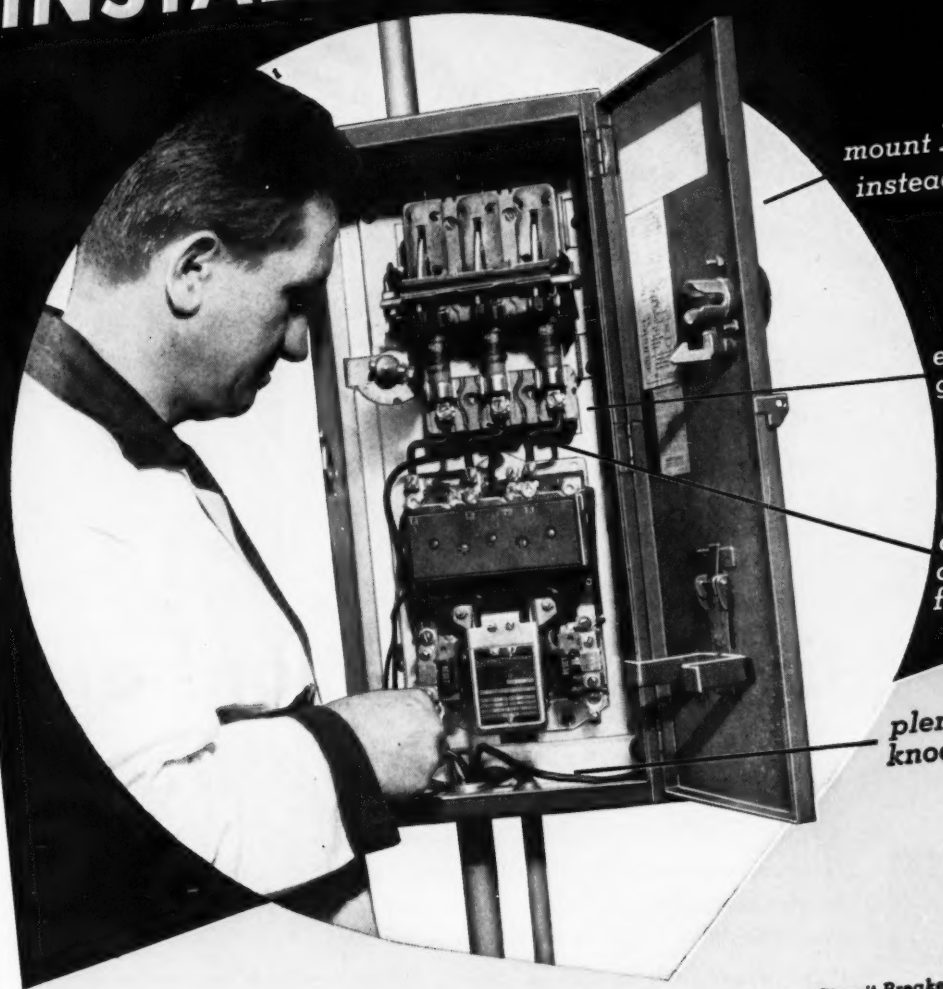
A most depressing aspect of increasing rates, and one often commented upon, is that "Uncle Sam" steps in and takes away in taxes more than half of the increased revenue.

Although our little outfit is in no better position than other utilities to absorb the mounting costs of doing business, we feel very strongly against the idea of asking our customers to "fork out" more than $2 so that we can get a needed $1 for ourselves.

We, therefore, are putting forth extraordinary efforts to increase our sales and reduce our costs wherever practicable so as

(Continued on Page 46)

EASIER TO INSTALL AND MAINTAIN!



mount 1 device instead of 2

extra-wide gutters

all components accessible from front

plenty of knockouts

SQUARE D COMBINATION STARTERS

(Switch or Circuit Breaker Types)

Save space and time. Mount and wire one device instead of two . . . neater, more attractive installations.

Write **for Bulletins 8538 and 8539**

Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

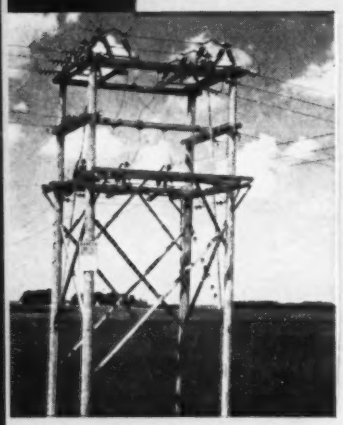
SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Watch for Square D's Display Coach—Now on Tour!

HOW TO MAKE A BETTER JOINT

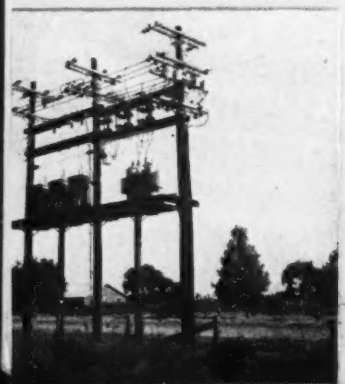
Follow these 4 Operations



Protect service continuity by applying the 4 operation Kearney Connection System to every tap, splice, terminal, bus fitting and ground connection on your system.

●

Don't risk switchgear failure due to overheating of connections. Terminal transfer surfaces need the protection of the Kearney Connection System.



JRK-237

Good Connections are a Valuable Investment

YOUR distribution system is no better than its connections.

Loads are skyrocketing. You'll be spending thousands for larger conductors, heavier switchgear, more substation capacity . . . and yet, *one high resistance, overheating joint can wreck all your good planning.*

It just doesn't pay to take a chance. Follow the good construction practice outlined at the right. When you do this you are taking the most important step possible toward elimination of outages, lowered maintenance costs and better customer relations.

Standardize on this simple, complete KEARNEY CONNECTION SYSTEM. You'll be saving yourself money and manpower for years to come. Write Dept. K today for complete information on any or all of these *system-saving* Kearney Products.

Specify

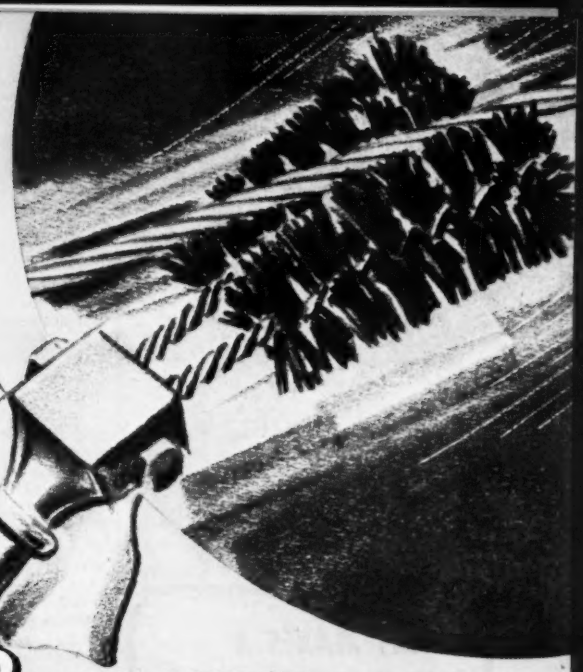
Kearney

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Ave., St. Louis 10, Mo.
Canadian Plant: Guelph, Ontario

MAYDWELL & HARTZELL, *Incorporated*
WEST COAST DISTRIBUTORS
Los Angeles • San Francisco • Portland
Seattle • Spokane • Phoenix

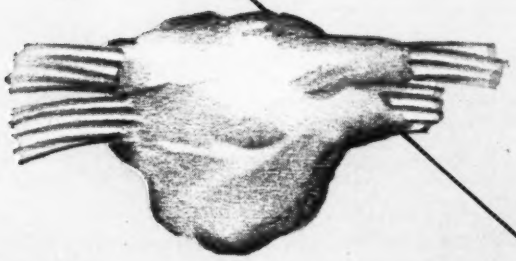
1 • CLEAN

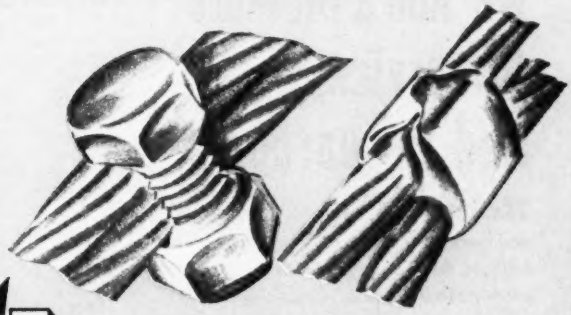
the conductors first. Remove every trace of corrosion or oxidation in order to provide high conductivity contact. A few short strokes of the *Kearney Cleaning Brush* quickly removes all corrosion, even deep down between strands. Available with sure grip handle or with fit-on attachment for hot stick use.



2 • PROTECT

the cleaned surfaces. Copper and aluminum oxidize very quickly . . . but, KEARNALENE *Inhibitor* chemically stops high resistance corrosion before it has a chance to start. It's handy to apply; will not harm the skin or damage conductors.





4 • SEAL

out all air and moisture to guarantee lasting protection against corrosion. You can prevent trouble even in bi-metallic taps by eliminating the electrolyte. *Kearney Airseal,* a pliable, removable high-dielectric compound is quickly and easily kneaded around the connection; permanently seals out corrosion. *Airseal* is supplied in 5 convenient sizes of pads and rolls.

3 • SELECT

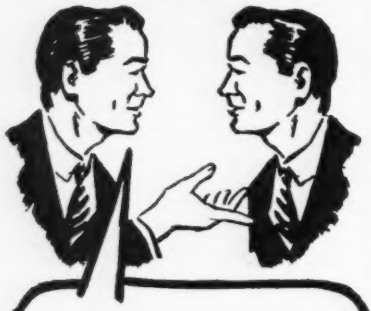
a connector designed for the particular job. A wide range of *Kearney Connectors* provides the exact type you need:

Con-Nec-Tite Split Bolt Connectors
Squeezon Compression Connectors
Pressurite Two Bolt Clamps
Parallel Groove Clamps
Laptite Service Entrance Connectors
High Conductivity Splicing Sleeves

PRODUCTS

For Better Construction . . . for **SAFER** *Maintenance*

DID YOU EVER ASK YOURSELF



WHAT MAKES A TOP FLIGHT MOTOR or GENERATOR BRUSH?

THE ANSWER IS SIMPLE...

Here at OHIO we "Add a Bit More" to Service, Design and Research . . .

Basically our organization develops and manufactures brushes from the raw material to the finished product. Although we carry standard items in stock, we also maintain a complete engineering staff to assist you in the selection and application of correct brushes for your equipment. We base our 35 years of reputable existence upon our SERVICE to INDUSTRY. Try Ohio for your brush requirements.

ORDER YOUR CARBON BRUSHES FROM A SINGLE SOURCE

West Coast Representative
C. F. BOWERS
544 S. San Pedro St.
Los Angeles 13, Cal.

THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

Letters

Starts on Page 42

to eliminate, if possible, or at least delay, the necessity for filing any increased rates.

On the first point, we have held breakfast, lunch and dinner meetings in each of our major divisions, inviting all electrical dealers, city officials and newspaper representatives. We outlined our problem frankly and told them that with their cooperation we hoped to avoid increased rates and the added sales resistance they would meet therefrom. Also that we felt this approach definitely would put a damper on further inflation of prices in our respective fields of activity. Through frequent contacts, advertising and other activities we are cooperating closely with dealers.

The response to this approach was most encouraging and, while it is too soon to predict results, we are very hopeful of licking the problem in this way. For example, dealer sales of the major electrical appliances (we do not merchandise) in January and February 1953 were substantially above sales in November and December 1952, and preliminary reports for the past two months indicate that the showing will be good.

Anyway that is our program and point of view. Maybe it's just a question of how fast we'll go broke!

PAUL P. ASHWORTH
General Manager
Telluride Power Co.
Richfield, Utah

To the Editor:

When, 25 to 30 years ago, we were working to organize the Southwestern Section and the Southern California Chapter and to get the IAEI to have a voice in "Code" (National Electrical Code) modifications, we old-timers envisioned a time when "Let the Code Decide" could be a legal decision as well as an influence.

To put the thought into other words, part of the effort was to publicize contradictions and "let nature take its course." It was a commonly accepted doctrine that everyone in the industry would desire a consistent, workable text that gave minimum standards for safety from hazardous conditions.

There is no need to evade the fact that the manufacturers, the Underwriters' Laboratories, the fire insurance group, the casualty insurance group and others have slightly different viewpoints and desires. They do and it is for the best interest of the country as a whole that they should. But—and this is the important fact—the code can provide a meeting ground for all those who are affected by its rules.

For the code to take this dominant position, the various parts must tell the same story. If they do not, the sum of the parts, the code is *not* consistent and the slogan "Let the Code Decide" is a meaningless phrase.

Let's leave the theory now and examine one or two cases where the foregoing applies.

Tables give the current-carrying capabilities of wire with different kinds of insulation. A couple of these are 25 amp for No. 10 R and 35 amp for No. 8 R. In that statement the code affirms, in effect, that more current than that creates a fire hazard. To keep from causing trouble, disconnecting devices are to be inserted at the source end. These devices are to be so constructed that if an overload is imposed upon the wires the devices will automatically remove the conductors from connection with the source of power.

That is perfect. The property owner can rest serenely upon the protection he has paid to have installed. That is what the code is for. And since he is getting the very thing that is needed, he will use the best obtainable.

"Sure," you can hear him say, "I do not want to ever have any worries about *this* house. Install circuit breakers throughout."

That is where he becomes disillusioned. The code cannot decide. The 1953 edition, paragraph 2403, in effect, states that the tables are wrong. No. 10 R wire can have 30-amp load and No. 8 R wire can be permitted to carry 40 amp.

"Let the Code Decide" no longer has any weight. Every city should enact an ordinance on which its citizens can depend. If the code does not know which is correct, the least it can do is to take a consistent stand and correct its paragraphs when the correct information has been obtained. Then the city can "Let the Code Decide."

If 25 amp is not the capacity of No. 10 R but 30 amp is permissible and if 35 amp is not the capacity of No. 8 R but 40 amp is permissible, then the information in the tables is false and misleading; other sizes are misrated, and the tables should be corrected.

If Sec. 240 is incorrect, only one conclusion can be reached. That conclusion is this: Rather than brave the storm of protest and pressure that a change in rating of fuses and circuit breakers would provoke, those nearest to the final decision would rather risk the hazards incident to overloaded, hence overheated, wires.

It takes far-sighted courage to make a "finished" code.

These criticisms are advanced constructively. The case is not hopeless. The code has truly advanced since the day I obtained permission to use a room in the Los Angeles city hall and followed up with personal invitations to all the city councils of southern California for the electrical inspectors to attend the first and subsequent meetings from which the Southern California Chapter grew.

For a better code.

JAMES MOORE EVANS, E.E., M.E.
Edwards, Calif.

To the Editor:

Let me congratulate you on your June issue—to me and I am sure to most of your readers it was the most interesting issue in a long time and in a long line of interesting issues.

Though all the articles were of great interest and value to all engineers connected with power distribution and transmission, R. H. Miller's article, p 110, on uses of electronics and J. F. Sinnott's article, p 115, are perhaps pre-eminent; both, like "Sam" Rosch of Anaconda Co. in his brilliant papers before the meetings of the IAEI, have the happy gift of leading the reader over the horizon and into the wonder world of tomorrow.

Both these articles left the reader like Oliver Twist wishing for more and regretting we had come to the end.

W. B. A. SPRAY
Kirkland, Wash.

SEE FOR YOURSELF WHAT MODERN LIGHTING MEANS

Architects, contractors and engineers; you owe it to yourself and your clients to see an installation of Sunbeam's modern, semi-indirect lighting fixtures, the #P1290 series. There are many reasons why these shallow, plastic shielded luminaires are being specified all over the country in offices, schools, stores, banks, drafting rooms and reception areas. The simple lines and very refined design are aesthetic reasons why these units blend smoothly into modern architectural motifs. High photometric efficiency, exceptional low brightness and generally pleasing lighting quality are technical reasons for their demand. Engineered mechanical features, making the fixtures easy to install and maintain, are practical reasons why contractors recommend them.

See an installation of Sunbeam's, all-white, #P1290 units today and we are confident that you will see fluorescent lighting at its best.

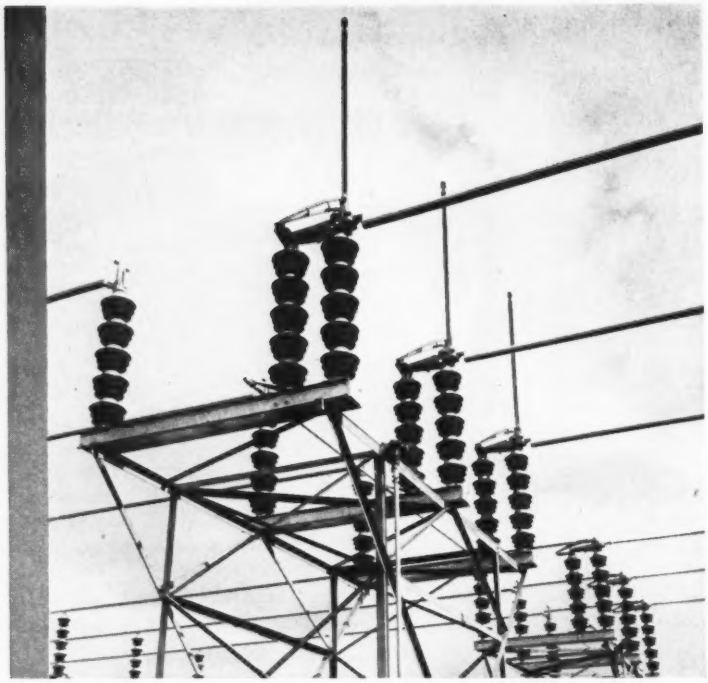
STATE DIV. OF ARCHITECTURE, LOS ANGELES

CONVAIR, POMONA, CALIFORNIA

SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIFORNIA

SCHWAGER-WOOD TYPE TA SWITCH

Here are two Schwager-Wood Switches —rated 230 KV—1200 amperes. The design of these switches incorporates the hinging of the blade over the rear insulator giving a substantial increase in the break distance. These switches conform to the highest standards and are available in all NEMA voltage and amperage ratings for outdoor air switches.



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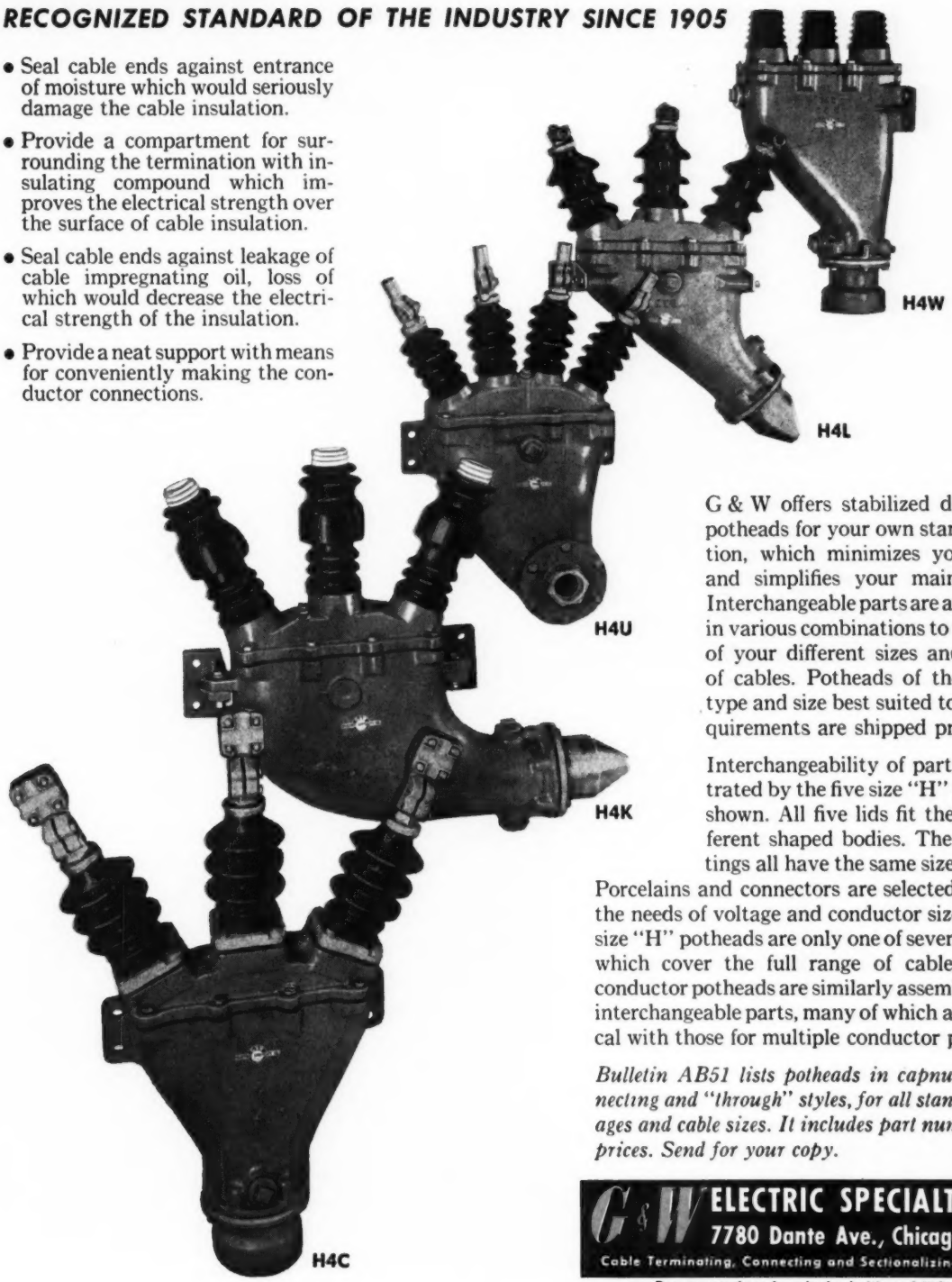
G & W Potheads

RECOGNIZED STANDARD OF THE INDUSTRY SINCE 1905

- Seal cable ends against entrance of moisture which would seriously damage the cable insulation.
- Provide a compartment for surrounding the termination with insulating compound which improves the electrical strength over the surface of cable insulation.
- Seal cable ends against leakage of cable impregnating oil, loss of which would decrease the electrical strength of the insulation.
- Provide a neat support with means for conveniently making the conductor connections.



G & W offers stabilized designs of potheads for your own standardization, which minimizes your stock and simplifies your maintenance. Interchangeable parts are assembled in various combinations to take care of your different sizes and ratings of cables. Potheads of the correct type and size best suited to your requirements are shipped promptly.

Interchangeability of parts is illustrated by the five size "H" potheads shown. All five lids fit the five different shaped bodies. The base fittings all have the same size 4 flange. Porcelains and connectors are selected to meet the needs of voltage and conductor sizes. These size "H" potheads are only one of several groups which cover the full range of cables. Single conductor potheads are similarly assembled with interchangeable parts, many of which are identical with those for multiple conductor potheads.

Bulletin AB51 lists potheads in capnut, disconnecting and "through" styles, for all standard voltages and cable sizes. It includes part numbers and prices. Send for your copy.

G & W ELECTRIC SPECIALTY CO.
7780 Dante Ave., Chicago 19, Ill.
Cable Terminating, Connecting and Sectionalizing Devices

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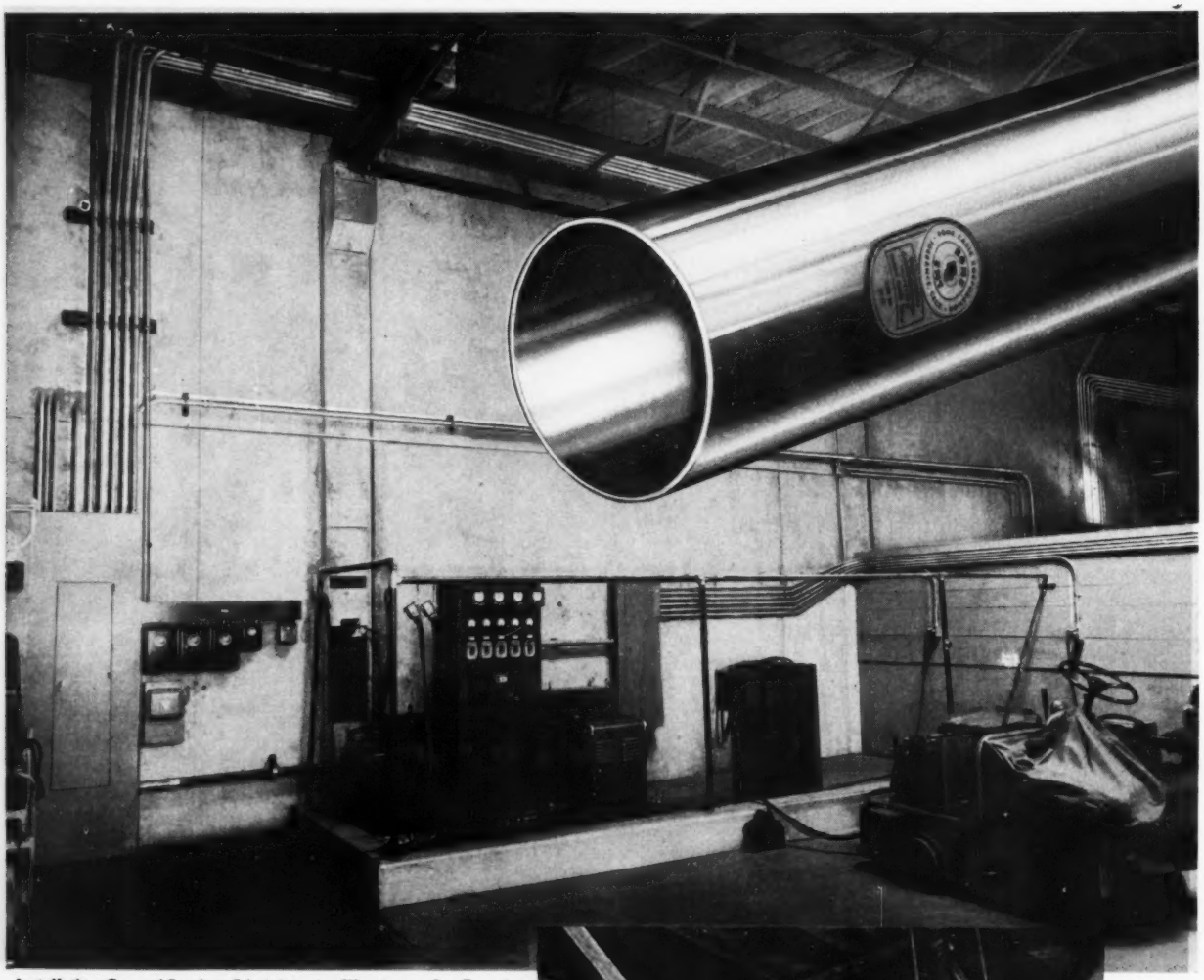
A534



Installation: General Services Administration Warehouse, San Francisco
Electrical Contractor: Charles B. Farrow, San Francisco

Upper runs of Rome • EMT carry wires and cables from main distribution panels and feeders to subpanels for lighting and conveyor systems. Lower runs carry distribution cables to battery-charging outlets from the main charging panel (lower foreground). Rome • EMT protects other wires and cables going from the lighting distribution panel to serve the warehouse office and truck entrance.

Rome • EMT is now available in the following sizes: STRAIGHT LENGTHS—½", ¾", 1", 1¼", 1½" and 2". 90° ELBOWS—¾", 1", 1¼", 1½" and 2".

Warehouse stocks located as follows:

San Francisco, Calif.	Los Angeles, Calif.
Chicago, Ill.	Salt Lake City, Utah
Dallas, Texas	Seattle, Wash.
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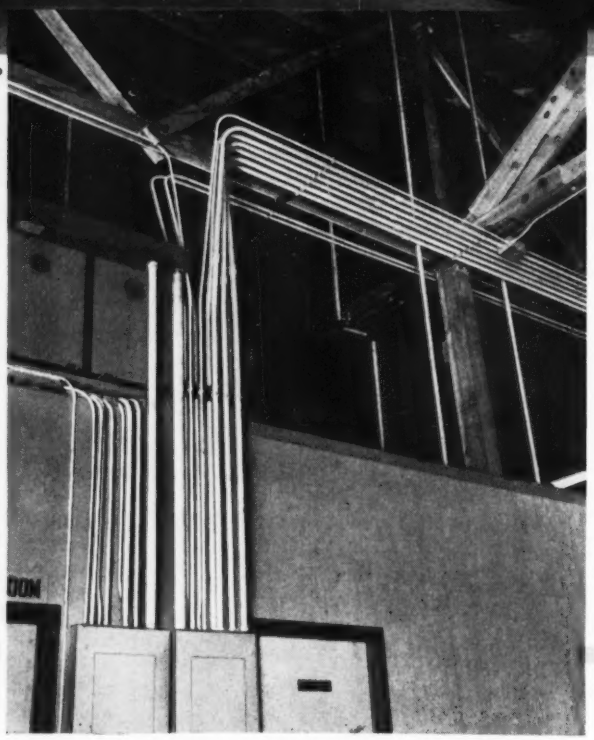

For unexcelled wire and cable performance:

RoZone® **RoLene**
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RoPrene® **RoBarn**
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You get Positive protection at substantial savings with Rome·EMT

Installation of Rome·EMT in the New General Services Administration Warehouse in San Francisco is another instance of its wide acceptance in the West.

In factories, generating plants, apartments, institutions, stores and office buildings, Rome·EMT provides safe and positively protected electrical installations. Electrically welded, it has unusual strength, while its electro-galvanized surface, uniformly coated with zinc, assures long-time resistance to corrosion. The mirror-smooth interior surface, absolutely free of burrs and rough edges, prevents cable injury and facilitates fishing and pulling. Precision manufacture assures uniform diameter and wall thickness.

Low installation cost is the great plus feature of Rome·EMT. Light in weight, it's easy to handle and bend—keeps costly man-hours at a minimum. Simple compression-type fittings assure quick, moisture-tight seals, without time-consuming threading.

It's easy to see why Rome·EMT is being specified for so many big wiring jobs. It's simple to install. It's *safe* to install. Fully approved by Underwriters' Laboratories, Inc., it meets all standards for thin-wall raceway!

You'll find that the quality, dependability and economy of Rome·EMT also extends to the entire Rome line of wire and cable. Whatever your requirements, your nearby Rome Cable office will be glad to help you in planning for them.

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MAIN STREET OF OAKWOOD, OHIO. LIGHTED WITH G-E FORM 206 FLUORESCENT LUMINAIRES, SETS PACE FOR WHITEWAYS OF THE FUTURE

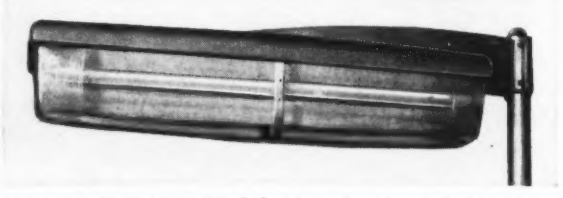
New General Electric Fluorescent Luminaire Introduces a Brighter, Broader Light Pattern

An entirely new standard of modern street lighting has been established by the new Form 206 fluorescent luminaire. Its broad, bright light pattern can make your city's busy streets the finest whiteways in the world. Its high light output is held constant throughout a broad range of temperature. This means you'll get effective lighting in any weather and during all hours of darkness. The new six-foot "Rapid Start" G-E fluorescent lamps are designed specifically for outdoor operation. They require no starters, have no starting flicker, and light within a second after being turned on.

NEW EASY INSTALLATION. Designed for speed, simplicity, and economy of installation, the Form 206's bracket is an integral part of the fixture. It requires no guys, trusses, or supports. The entire unit, including bracket, weighs about 100 pounds, and is less than seven feet long.

NEW ECONOMICAL MAINTENANCE is assured with lamps rated 7500 hours. The completely enclosing plastic globe, hinged at one end, swings down and remains in position for fast, easy, servicing.

FOR MORE INFORMATION contact your nearest General Electric Sales Office or write for Bulletin GEC-963, Section 452-133C, General Electric Co., Schenectady 5, New York.



MODERN APPEARANCE of aluminum housing and clear plastic globe adds beauty to your city's streets. Clean appearance is made possible by internal wiring and internal ballast mounting.

You can put your confidence in—

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

You Get *Permanent Protection* for your transmission lines

You can be sure of safe, economical, and permanent protection when you string Copperweld* Overhead Ground Wires atop your transmission lines. Copperweld's thick copper covering, inseparably molten-welded to the strong alloy steel core of each wire, provides the necessary electrical conductivity for relaying and for the dissipation of lightning discharges. Because this copper covering is corrosion-resistant, the rugged strength of every wire in the strand is constantly protected. This permanent high strength assures ample mid-span clearance for the most severe operating conditions.

If you're looking for transmission line protection that pays for itself in longer life and less maintenance, install Copperweld Overhead Ground Wires. You'll be glad you did for years to come. Write today for your copy of the Copperweld Engineering Data Book. *Trade Mark

COPPERWELD STEEL COMPANY, *Glassport, Pa.*

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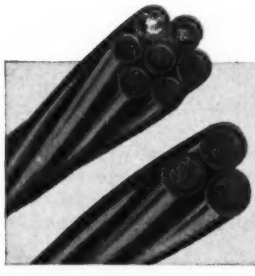
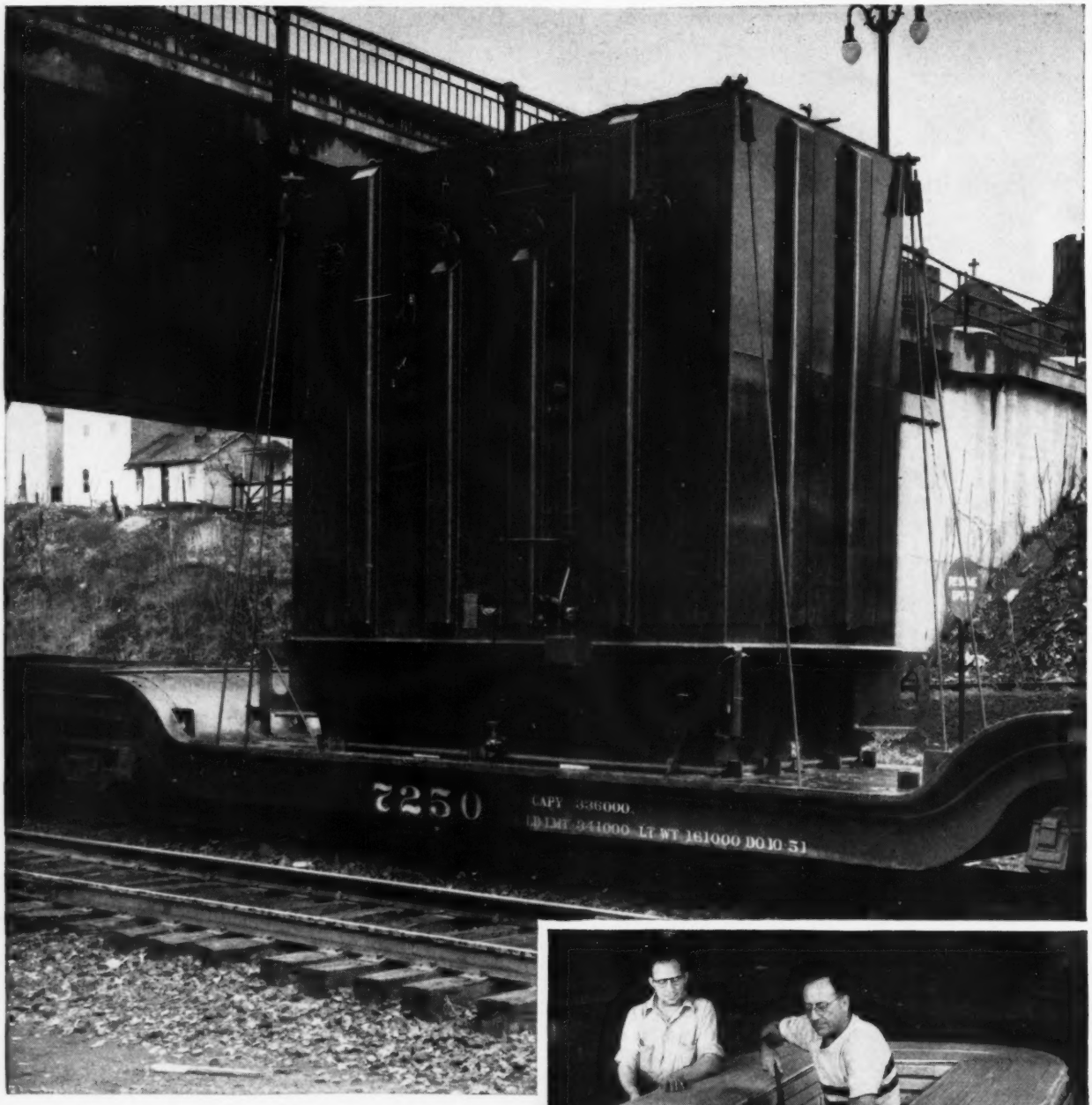


Copperweld TRADE MARK **NON-RUSTING**

OVERHEAD GROUND WIRES

Last The Life Of The Conductors They Protect!



190,000-KVA "FORM-FIT" UNIT enroute to St. Claire Station on Detroit-Edison System . . . the highest capacity unit ever built, but still smaller, physically, than other units on this user's system rated only 145,000 kva!

BETTER SURGE STRENGTH is inherent in "Form-Fit" construction which uses fewer coils of large area. This practice results in greater coil-to-coil and less coil-to-ground capacitance, giving much better surge distribution.

190,000-kva transformer clears low bridge with room to spare!

. . . "Form-Fit" design made it possible

For years, engineers have recognized that shipping facilities were the prime limitation on transformer capacity. Not too long ago, a transformer rated 190,000 kva would have been impossible to transport.

But this record-capacity Westinghouse "Form-Fit" Transformer was shipped in one piece, factory-assembled, from Sharon, Pennsylvania, to Detroit, Michigan. Since no split tank was required, installation was simplified.

Statistically, "Form-Fit" has cut the over-all size of Westinghouse Power Transformers 20%, reduced occupied ground area 15%. These reductions make possible shipment of even greater single unit capacity in the future with corresponding savings in installation time and expense.

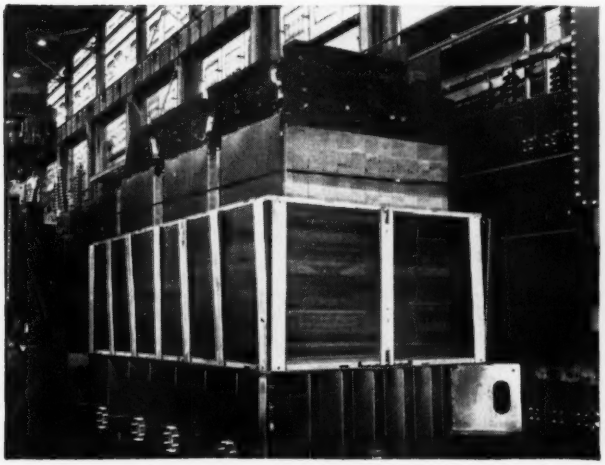
In addition, "Form-Fit" transformers will better absorb the shocks of handling and shipping—the stresses of short circuits and electrical surges—without damage. The core surrounds, supports and protects the coils, giving added mechanical and electrical strength. The tank fits snugly over the laminations—braces the assembly still further.

These facts are only part of the story of "dependability at lower cost" offered by Westinghouse Power Transformers. Information on other features like the superior insulation structure, the efficient cooling system, is in the hands of your local Westinghouse representative. He'll be glad to discuss it with you; or write direct for booklet B-4142-A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

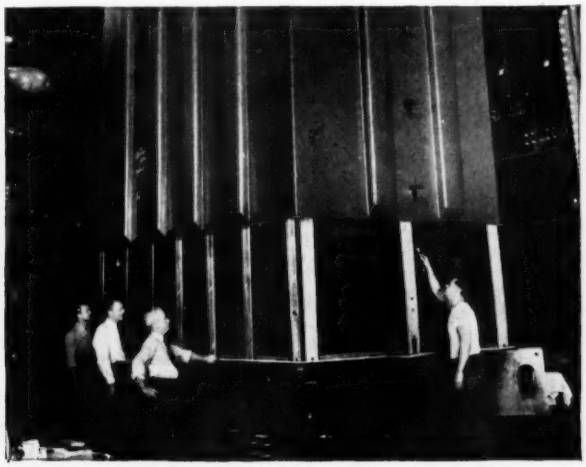
J-70679

YOU CAN BE SURE... IF IT'S Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver



BETTER MECHANICAL STRENGTH is added to the coil assembly by the Hipersil® laminations, which are clamped by the inside of the tank. Possibility of internal damage from electrical and mechanical forces is greatly reduced.



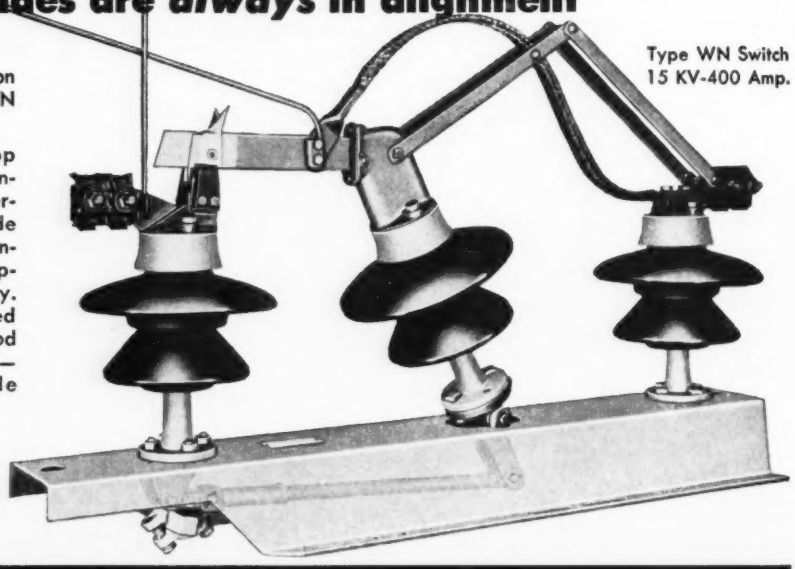
BETTER THERMAL CHARACTERISTICS are obtained by use of vertical pancake coils. Vertical cooling ducts form natural flues . . . ideal for forced oil cooling without special devices for directing flow.

Eliminate Pole Top Switch Adjustments...

these blades are *always* in alignment

Forget maintenance problems on pole top switches. Chance WN-VN Switches *can't* get out of line!

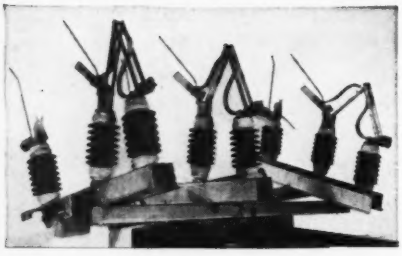
Why? Because these pole top switches have the Chance Compensator Control that keeps the operating force in line with the blade motion. An extra wide tilting insulator mounting gives solid support that eliminates side-play. Bases are deep drawn and flanged —they won't cut into the wood supports and loosen the bolts— they resist twisting and side distortion.

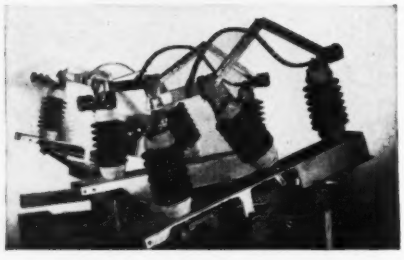


Type WN Switch
15 KV-400 Amp.

Phantom view shows the exclusive shielded Compensator Control Mechanism that gives extra leverage —offsets structural distortion—prevents insulator shock from "slamins"—simplifies installation.

CHANCE WN-VN SWITCHES





make positive contact under all conditions

You get top performance under all conditions with Chance WN-VN Gang Operated Switches. Switch blades *always* seat regardless of warping, twisting, settling or bowing of the supporting structure. The photographs at left show how the dead toggle on each base permits every blade in a three pole switch to make complete contact in spite of extreme distortion. No special adjustments were necessary to compensate for the distortion on this "torture rack" test.

* * *

Chance pole top switches are easy to install because the interphase shaft is simply lifted and clamped into position —you can even mount them below the pole top without shifting these switches off balance.

For conditions of extreme corrosion, a special protective Neoprene coating for the flexible braid is available at slight additional cost.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO.

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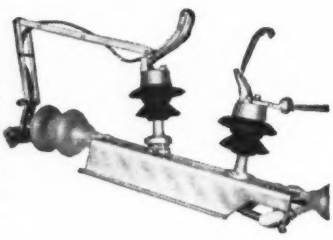


Chance Type VN 200 Amp. Switch. A two-insulator tilting type switch built for service and economy.

C5349

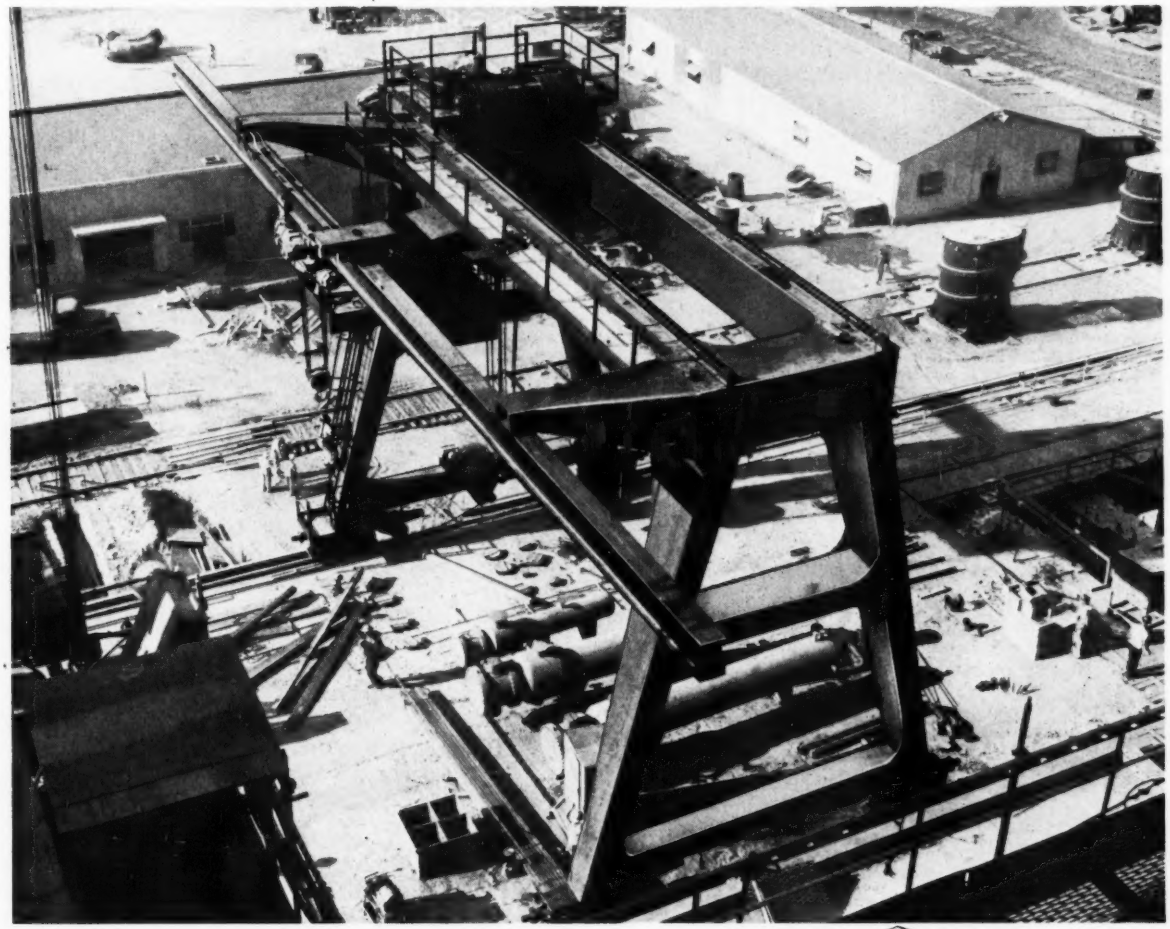
Built by PACECO

GANTRY CRANE FOR ETIWANDA STEAM STATION

Engineered for Southern California Edison Co.
by Stone and Webster Engineering Corp.

MAIN HOIST: CAPACITY, 60 TONS • MAXIMUM LIFT, 65' • RATE OF LIFT, 4' PER MINUTE

SPAN OF GANTRY FRAME, 48' • HEIGHT, 41'6" • GANTRY IS DRIVEN AT 29.7' PER MIN. BY TWO INTERLOCKED 5 H.P. MOTORS

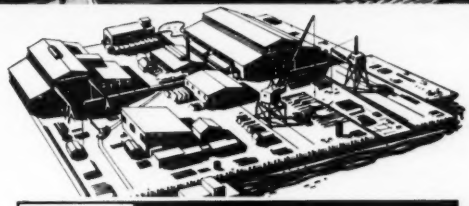


• Built by PACECO to install and service the main steam turbines and generators, this crane has many of the recent features developed by Pacific Coast Engineering Company.

Trolley structure is all-welded. PACECO's skill in fabricating heavy plate is used to design and build the equalizing gantry trucks. Box-type girder legs and girders are field-assembled with clean bolted connections.

PACECO integral load brake reducer eliminates the risk of shifting of pillow block centers and assures permanent alignment of gear and pinions, both supported in one heavy girder.

PACECO cordially invites your inquiries on cranes and hoists of all types, as well as gates, penstocks and other units requiring expert handling of heavy plate together with precision construction.



PACECO®
"TAILORS OF STEEL"

Pacific Coast Engineering Co.

ENGINEERS • MACHINISTS • FABRICATORS

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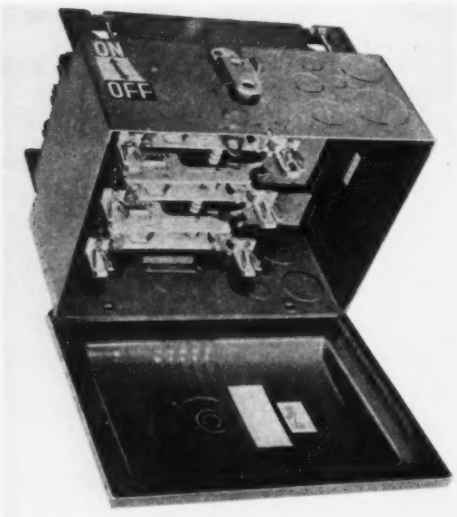
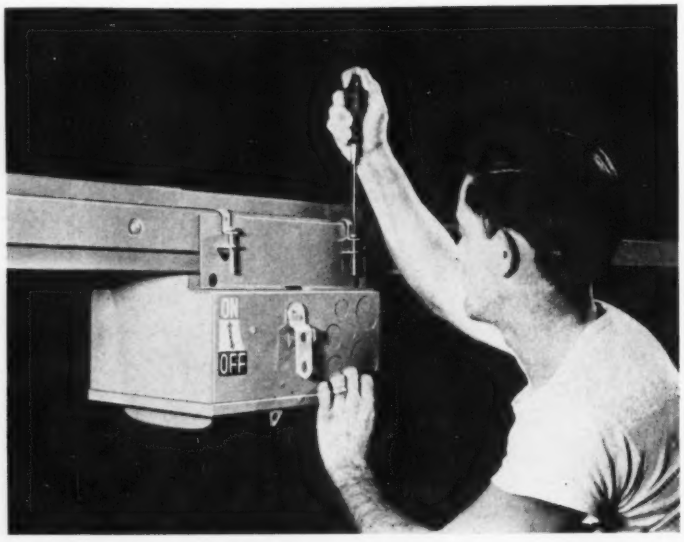
PRODUCT NEWS





Trumbull's new Flex-A-Plug for tapping busway is shown above. Below, service body now in production by West Coast company

New Device Taps Busway for Current-Carrying Equipment

(1) Trumbull Electric Department of General Electric Co., Plainville, Conn.

Using the principle involved in plugging into a wall socket, the new FG Flex-A-Plug taps power from the manufacturer's heavy current-carrying FVK Flex-A-Power busway for machines and other equipment.

According to the manufacturer, installation is made easier and faster by new hanger clips that hold the plug in position while screws are tightened to anchor it firmly to the Flex-A-Power housing. In a test, an electrician installed the new plug in three minutes as compared with 12 minutes for the old-type plug, it is pointed out.

Electrically the new plug features the same type interior used in the manufacturer's HCI safety switches. This interior operates on the circuit breaker principle of arc interruption. Use of grid pins, magnetic repulsion and other circuit breaker principles to interrupt arcs gives this interior a high momentary current rating, ability to resist heavy current surges without damage, according to the manufacturer.

Mechanically the plug is designed with heavy-gage steel side shields that protect its stabs, copper prongs that provide contact with the Flex-A-Power bus bars. Stabs are further protected by an encasing phenolic shield, which also provides electrical insulation.

The new plug is available in 30-, 60-, 100- and 200-amp ratings.

For Additional Information on These Products Fill in Coupon on Page 80

Service and Maintenance Body

(2) Utility Body Co., 1530 Wood St., Oakland, Calif.

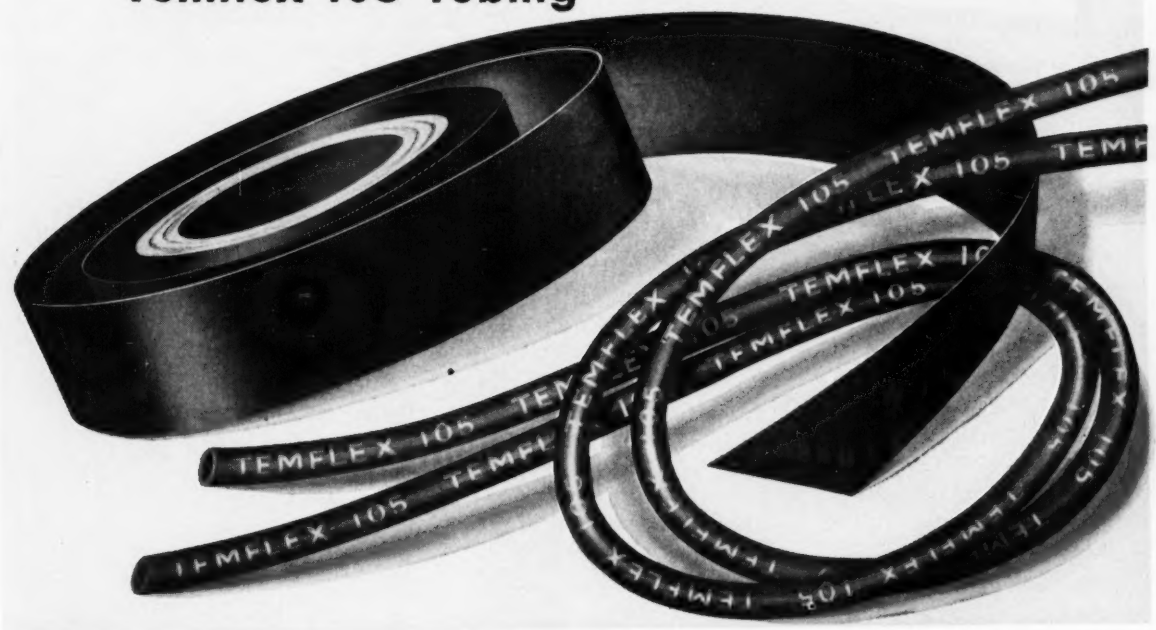
A line of standard service bodies for installation on ½-, ¾- or 1-ton truck chassis and special units for 1½-ton and larger chassis have been put into production at a West Coast plant.

Model S-48 (pictured) has a full 48-in. bed width; is available also with optional sliding cover and endgate enclosure for enclosing the work area completely. It has a choice of side-angle or overhead-type ladder rack as standard equipment but, if neither is required, the cost is deductible. The flush pull-out type door handle has slam action catches and master keyed cylinder locks.

The body has an antibuckling heavy-duty corrugated steel floor with drainage outlets. Top panels are ribbed for extra strength. Model S-48 has a body length of 90 in.; S-40, 75 in.; S-60, 104 in.

Series E, with larger enclosed superstructure body, and series U for converting pickup trucks into service bodies are also available.

Now- an Irvington
PLASTIC INSULATING TAPE
with the heat- and oil-resistance of Temflex® 105 Tubing



Here is a new addition to the Irvington family of insulating tapes — Temflex 105 Plastic Tape, based on the *same* formula that has made Temflex 105 Tubing the leader where service calls for continuous operation in air at 105° C. — or in oil at 90° C.

Temflex 105 Tape is strong and flexible — possesses exceptional elongation. It can be easily hand wound over bus bars, coils, cables — even over very irregular surfaces — or can be used in taping heads. Temflex 105 Tape frequently offers substantial savings as compared with varnished cambric. Easily baked to a homogeneous mass, it also offers cost economies over pressure-sensitive tapes.

Made in thicknesses of .007", .010" and .012"; widths from ½" to 34". Dielectric strength as high as 1200 vpm *even at 100° C.* Tensile strengths up to 3100 psi — elongation 165% to 240%.

Look to IRVINGTON for Insulation Leadership

INSULATING VARNISHES
VARNISHED CAMBRIC
VARNISHED PAPER
VARNISHED FIBERGLAS
INSULATING TUBING
CLASS "H" INSULATION

You probably know Temflex 105 *Tubing* — you'll certainly want to learn about Temflex 105 *Tape*. Mail the coupon for technical data sheet.

Send this convenient coupon now

Irvington

VARNISH & INSULATOR COMPANY

22 Argyle Terrace, Irvington 11, New Jersey

Plants: Irvington, N. J.; Monrovia, Calif.; Hamilton, Ontario, Canada

Irvington Varnish & Insulator Company
22 Argyle Terrace, Irvington 11, New Jersey

Gentlemen:

Please send me technical data sheet on your new Temflex 105 Tape.

Name..... Title.....

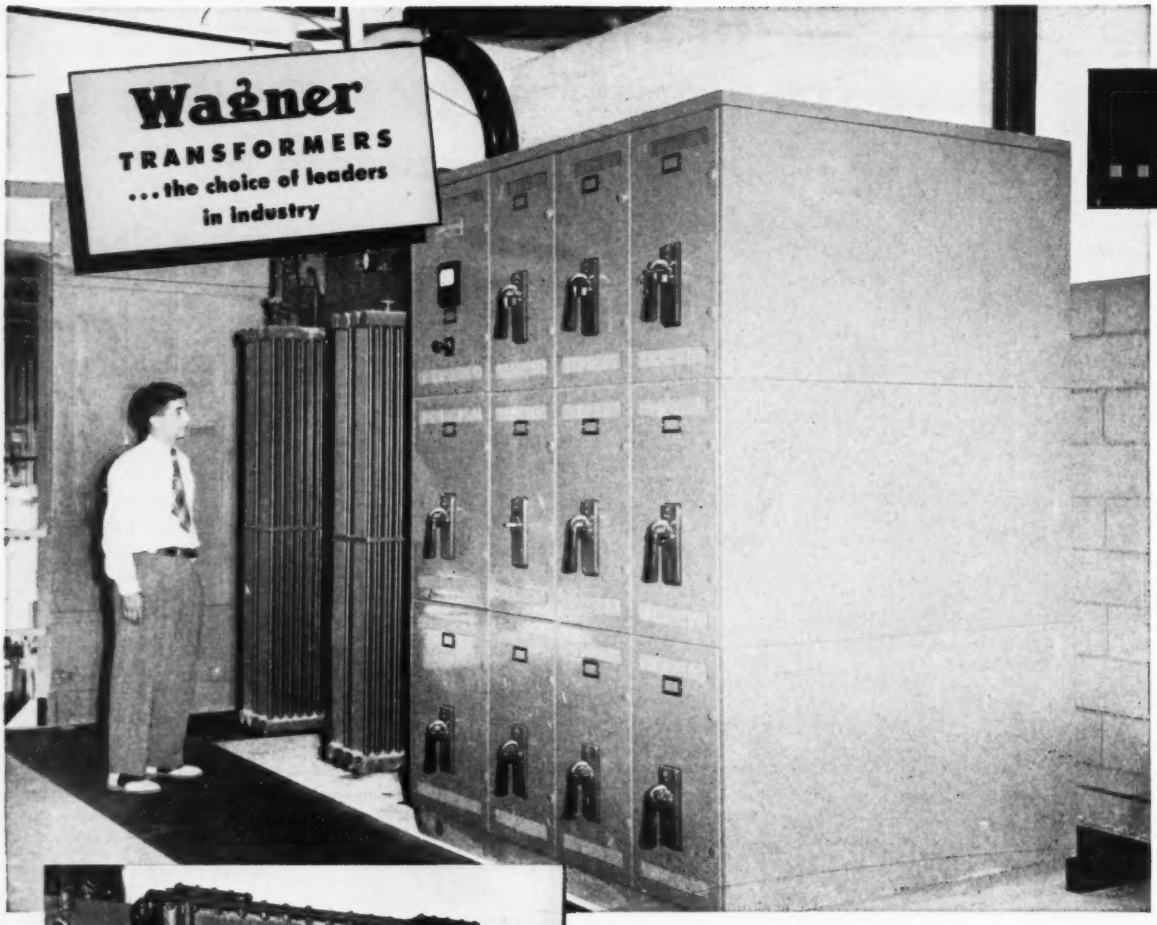
Company.....

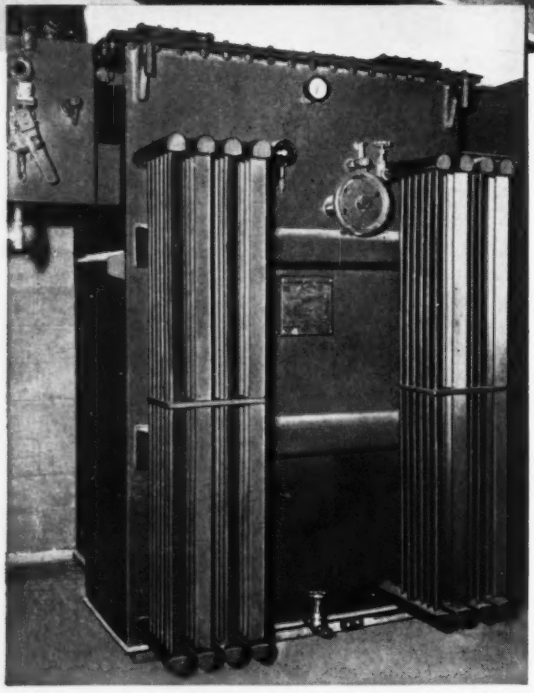
Street.....

City..... Zone..... State.....

EW 8/53

Represented in Western States by: C. D. LaMoree, Los Angeles, Berkeley, Portland, Seattle; Electric Motor Supply Co., Denver; J. R. Christensen Agency, Salt Lake City.





1000 kva, liquid-filled unit substation transformer, one of seven, installed at the New Brunswick, New Jersey, plant of the Studebaker Corporation.

The importance of the transformers in your plant power distribution system cannot be overemphasized. If a switch or a circuit breaker fails, only a part of the system is affected—but if the *transformer* fails, the entire system is dead. When you specify Wagner, you can be sure of a dependable, continuous flow of power.

Wagner Unit Substation Transformers, both liquid-filled and dry-type, are carefully designed to meet distribution requirements. Both liquid-filled and dry-type unit substation transformers are built in ratings through 2000 kva, 15 kv and below—you can choose the type and rating that exactly meets your load-center distribution requirements.

Bulletins TU-13 and TU-56 give full information. Your nearby Wagner engineer can help you solve your load-center problems. Call the nearest of our 32 branch offices, or write us.

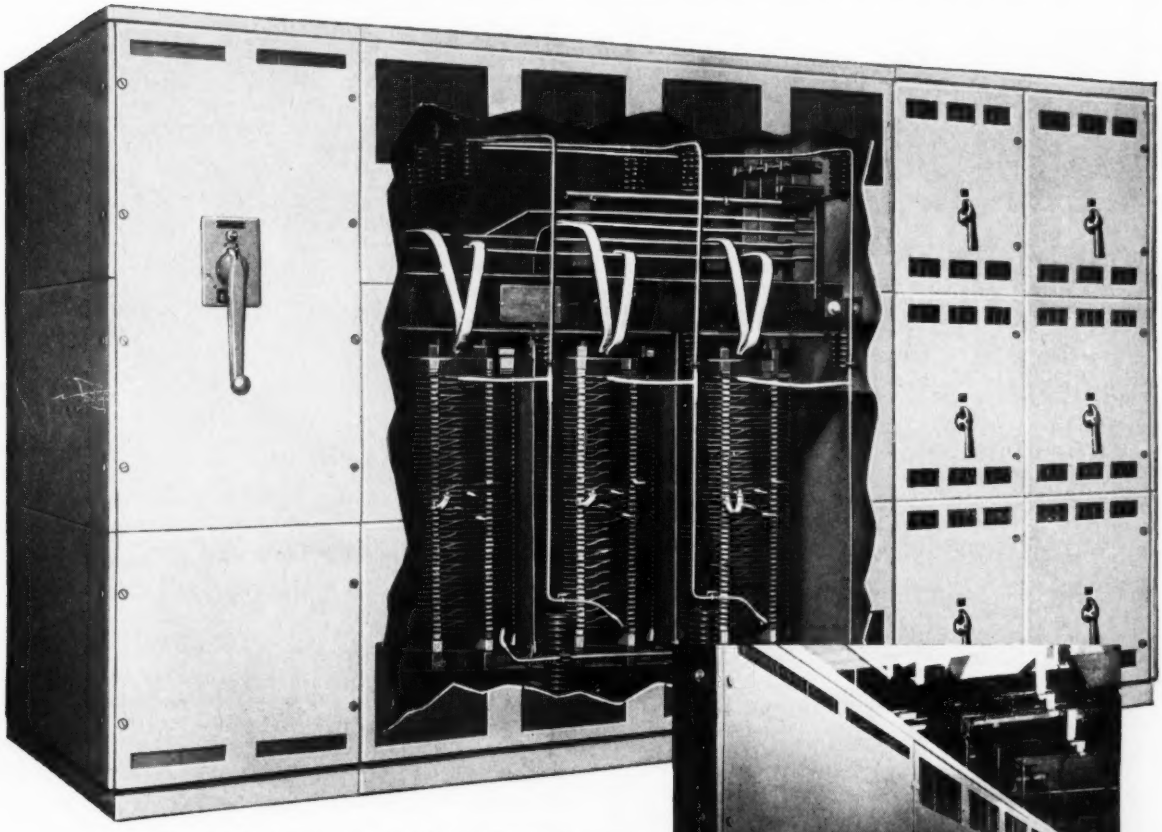
Wagner Electric Corporation
EST 1891

T53-11

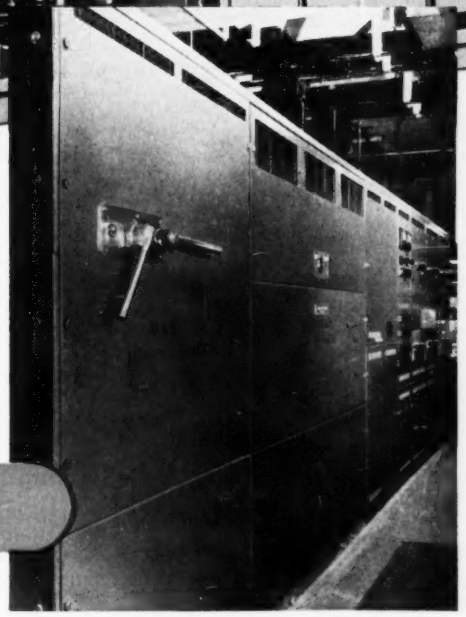
Don't take transformers for granted

Specify Wagner Unit Substation Transformers

for dependable load-center distribution



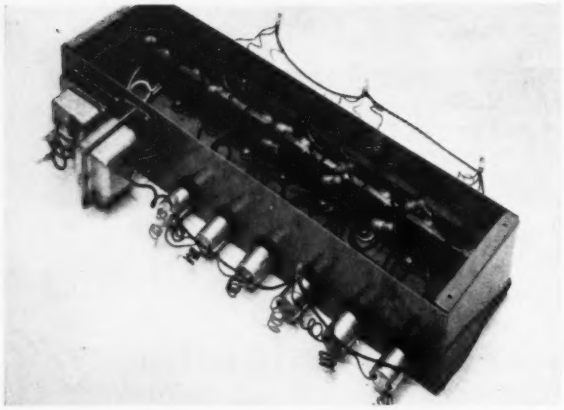
This metal-clad load center, at the Western Electric Company, Allentown, Pennsylvania, is equipped with a 500 kva Wagner dry-type transformer.

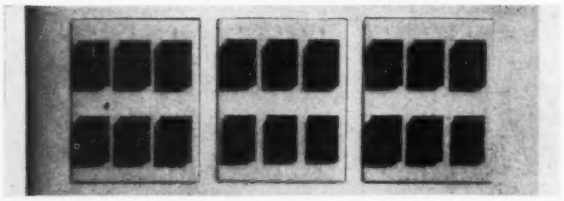


WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES





Multiple Switching

(3) Touch-Plate Mfg. Corp., 1766 Seabright Ave., Long Beach 13, Calif.

Designed especially for tract installations this factory prewired unit reduces the installation to a simple operation of joining wires that are completely color coded, the manufacturer states. With this system three- and four-way control may be secured without additional 110-v wiring, the manufacturer states. Any house lights selected may be turned on or off either from local switches or from one or more remote master panels. Master panels come in three sizes to control 6, 12 or 18 lights.

Circulating Air System for House Heating

(4) Electrend Products Corp., St. Joseph 2, Mich.

An automatic electric house heating system reheats warm air that has risen to the ceiling and recirculates it to bring living areas to required temperature.

The system uses a metal duct approximately 7 ft high, 8 in. wide and 3½ in. deep, with grille-covered openings at top and bottom. A fan, mounted inside the upper grille, draws off the layer of warm air ordinarily present just under the ceiling and sends it down over the electric heating element located just above the lower grille. The heated air then flows out of the lower grille and across the floor. The duct itself remains at room temperature.

One or more ducts are mounted between the studding of the walls in each room, depending on its size and use. A thermostat on front of each unit controls each separately.

Each unit weighs 25 lb and is said to be easily placed in position, resting on a sill piece with a single cross member holding top of duct in place. No sheet metal work or special fitting or cutting are needed, the manufacturer states.

Derrick Hydraulically Operated

(5) McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.

The new Series HD-1 hydraulic derrick can be raised to operating position in less than a minute, according to its manufacturer, and can be spotted in an unlimited number of positions, even under full load. Derrick movement is actuated by twin hydraulic cylinders from a hydraulic pump driven by an SAE power take-off on the chassis transmission. Controls usually are installed in a rear compartment of the body to give the operator an unobstructed view.

Rated capacity is 6,000 lb, when head sheave is 5 ft to rear of side-leg pivot points and 2,500 lb at maximum distance of 14 ft. In field tests the derrick has pulled a 45-ft pole, sunk 9 ft in solid-packed earth.

The center leg has been eliminated, only a single-drum winch is required and it is claimed that there is no obstruction to body loading area, no creeping under load, no kick-back. Alterations may be made to adapt the derrick to various bodies and modifications to increase length or capacity can be made, if desired. Details in bulletin 405.

For Additional Information
Fill in Coupon on Page 80

Westinghouse Microwave Letter

WESTINGHOUSE ELECTRIC CORPORATION, ELECTRONICS DIVISION, 2519 WILKENS AVE., BALT. 3, MD.

30 Independent Channels Give Maximum Communications Capacity...Reliability

Many critical communications and control requirements are solved by microwave—the newest complete system of communications. When you compare the practical advantages of presently available microwave systems, consider these facts about the new Westinghouse 2000 MC Microwave.

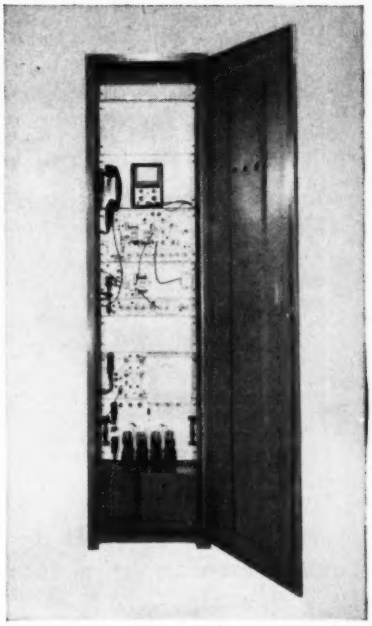
This Westinghouse system is based on (1) an extensive field and laboratory study of user requirements, and (2) years of valuable manufacturing and application experience with all types of end-use equipment. Selection of the 2000 MC band is one important result. This band provides more capacity than lower frequencies . . . gives less fading than higher frequencies.

Another important result is capacity: Westinghouse 2000 MC Microwave supplies 30 voice channels—more than enough for most present needs and capable of accommodating future needs. An independent 31st channel supplies service communications.

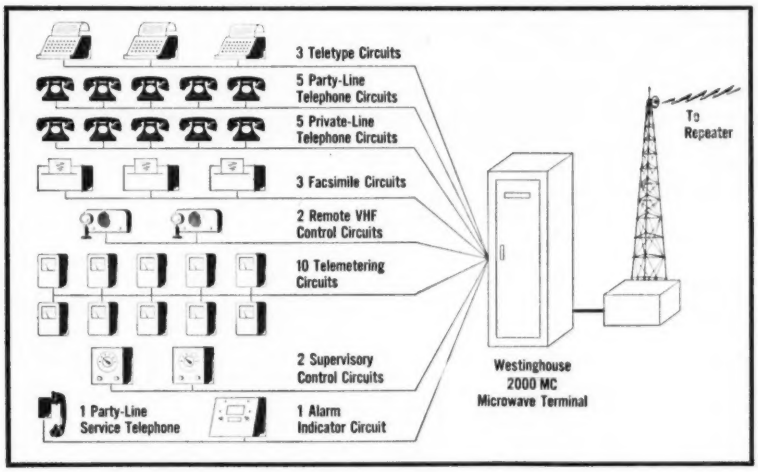
Each of these 30 voice channels can handle up to 15 telegraphic circuits. At full telegraphic capacity, 450 circuits are available for teletype, telemetering, VHF control, supervisory control, relaying, load control, and other functions. See illustration below for a typical arrangement.

These functions of Westinghouse microwave are based on a simple, flexible system of utmost reliability. Its two streamlined assemblies – Type FR Microwave Radio (illustrated) and Type FJ Multiplexing Equipment – have only four basic units each. Type FR Radio units can be assembled as either terminal or repeater stations. Type FJ Multiplex panels are entirely self-contained . . . each panel is provided with an individual power supply . . . and for high multiplex channel stability each channel has individual crystal control.

Strict channel independence like this means multiplexing reliability. If one channel develops a fault, all other channels continue to operate without interruption. That's why Westinghouse multiplex equipment, using frequency division, is your greatest guarantee of service continuity.



Westinghouse Type FR Microwave Radio assembly. Service channel and alarm panel are included for safe, efficient operation.



One of the many combinations of services that can be operated simultaneously over one microwave radio beam in Westinghouse 2000 MC Microwave radio.

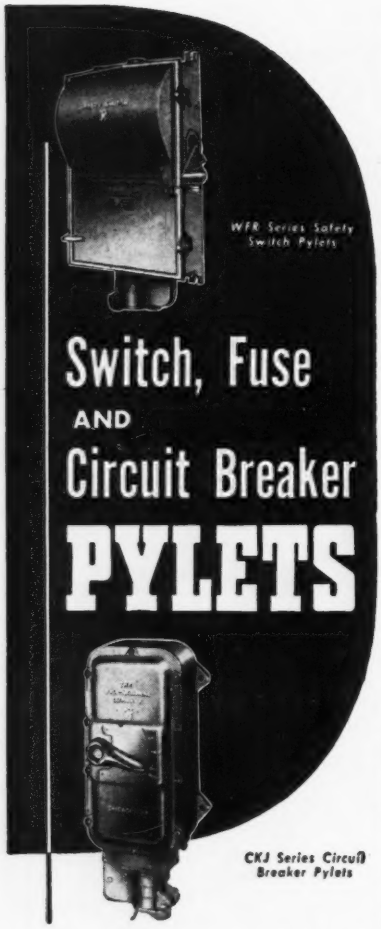
Westinghouse has called upon its years of practical experience in microwave communications to suggest other beneficial design features for the new 2000 MC equipment. Call your Westinghouse representative or write: Westinghouse Electric Corporation, Electronics Division, Microwave Section, 2519 Wilkens Ave., Baltimore 3, Maryland.

Ask for our Microwave Booklet.

YOU CAN BE SURE...IF IT'S Westinghouse

J-02274

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver



For Reliable Service Under Most Severe Industrial Plant Operating Conditions

Heavy duty safety switches, fuse boxes with or without plug receptacles, and circuit breaker Pylets provide for reliable service under the severest of industrial plant operating conditions. WFR series safety switch Pylets have heavy cast metal case and cover, quick make and break mechanism interlocked with cover and with plug receptacle, and weathertight gaskets on both cover and hub plate. Safety switches without interlocking plug receptacles are also available. Circuit breaker Pylets, CKJ Series, are but one of the complete line of fuse and circuit breaker fittings, which offer features of sound design and substantial construction to assure reliable service. Consult your Pylet catalog 1100, Bul. 1150 for complete listings.

CONDUIT FITTINGS • FLOODLIGHTS

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Ave., Chicago 51, Ill.

Wrench

(6) Appleton Electric Co., 1701 Wellington Ave., Chicago, Ill.

A new utility wrench was designed for easier and faster assembly of thin-wall fittings and combines deburring and nonslip tightening in one tool. It is for use with the manufacturer's compression-type couplings and connectors and two-piece connectors. It comes in two sizes, each with double ends, to handle ½- and ¾-in. or 1- and 1¼-in. fittings. It is made of hardened drop forged steel.

As a deburring tool, the wrench smoothes newly cut ends on thin-wall conduit, inside and out simultaneously. When used as a wrench, the nonslip shoulder plate and overlap lip hold the wrench snugly, both horizontally and vertically, on the nut to be tightened. Between tightening turns, the wrench is lifted slightly off nut and turns freely on the rounded edge of the nonslip shoulder plate, the manufacturer states.

(7) **PLASTIC TAPE** — A new splicing tape for electrical applications has been announced by the Boston Woven Hose & Rubber Co., P. O. Box 1071, Boston 3, Mass. Its dielectric strength averages more than 1,000 v per mil of thickness, according to the manufacturer. It comes in 60- and 20-ft rolls in ¾ in. widths and in a 12½-ft roll with a ½ in. width.

(8) **HOME VENTILATOR**—A 250-cfm Poweraire home ventilating fan for permanent installation in the ceiling is available from Westinghouse Electric Corp., Appliance Division, 653 Page Blvd., Springfield 2, Mass. This model 8PCV is said to be well suited to the smaller kitchens found in modern homes or for the laundry.

Heater Control

(9) Titan Mfg. Co. Inc., 701 Seneca St., Buffalo 10, N. Y.

A plug-in attachment to provide thermostatic control for electric heaters is called the Therm-O-Dial. It is completely self-contained and requires no wiring other than plugging heater cord into the built-in receptacle.

This device responds only to changes in the temperature of the air in the room and not to radiant heat from the heater case. It is housed in a metal case that includes a thermostatic control, built-in receptacle and 6-ft cord set. The unit may be mounted or hung on the wall at any desired height. Temperature range is from 35 to 95 F for the thermostat and the unit will operate with any electric heater up to 1,650 w.

(10) **INSULATION**—A new Class H silicone rubber-coated cloth insulation is said to have unusually high dielectric strength and increased tensile strength. Made by Mica Insulation Co., Schenectady 1, N. Y.

Use this coupon if: (1) you have a problem; (2) want to ask a question; (3) want to comment on any department in the magazine (4) have a "gripe."

Dear Editor:

NAME ..... TITLE .....

COMPANY .....

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CITY ..... STATE .....

Cut labor and material waste

WITH NATIONAL ELECTRIC

FLEXSTEEL

FLEXIBLE STEEL CONDUIT

Rounded channel-iron shape adds strength

—makes fishing easy over roller-bearing surface. The spring action of cold-rolled steel holds a true circular cross section under any bend.

For **convenience** and **economy** you can't beat Flexsteel . . . Safe . . . Strong . . . Permanent. Available through leading electrical distributors.

Flexsteel is a *fully grounded*, light wall steel conduit system at *minimum cost*. It cuts installation time 50% under rigid conduit. Saves conduit footage. Virtually eliminates waste in material and labor time. Here's why:

- No bending tools needed
- No exacting measurements required
- No coupling or jointing—easy to fit
- Easy to carry and handle
- Easy to cut on the job
- Easy to fish

Listed by Underwriters' Laboratories, Inc. Flexsteel is a fully approved "pull-in, pull-out" wiring system.

EVERYTHING IN WIRING POINTS TO

National Electric Products

PITTSBURGH, PA.

3 PLANTS • 7 WAREHOUSES • 34 SALES OFFICES

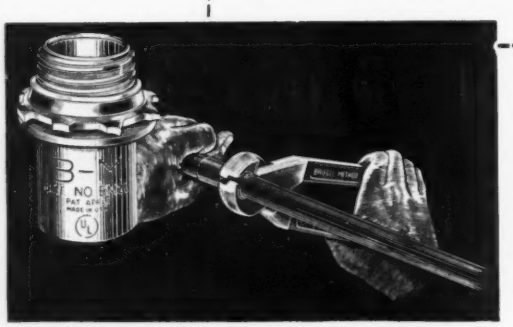
....YOURS
AT NO COST

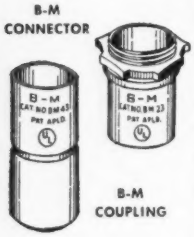
Free

THIS No. 606-½"

WAGNER B-M INDENTER

in every carton containing
200—½" Wagner B-M Couplings and
400—½" Wagner B-M Connectors.





★ Take advantage of this offer now. It pays to use the WAGNER B-M Couplings and Connectors, and it will be a saving for you to get the No. 606—½" WAGNER B-M Indenter FREE. This special package offer is for three months only—August, September, and October. Wagner Wholesalers across the country are stocked and ready to serve you.

WAGNER REPRESENTATIVES . . . listed below will answer your questions and work with you. Stars indicate local warehouse stocks.

★ Denver 2, Colorado — Phone—Tabor 3991
FRED E. STAIBLE & SONS, 2046 Arapahoe Street

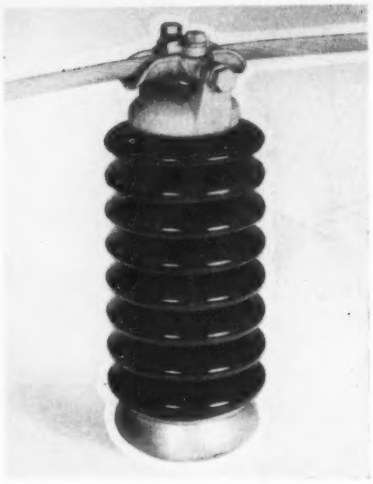
★ Los Angeles 12, California — Phone—Michigan 5619
MURPHY-HAIN COMPANY, 720 East Second Street

★ San Francisco 3, California — Phone—Underhill 1-2367
HODGES & GLOMB, 1264 Folsom Street

★ Seattle 4, Washington — Phone—Elliott 8882
NORTHWESTERN AGENCIES, 4130 First Avenue, South

WAGNER MALLEABLE PRODUCTS CO.

222 W. ADAMS STREET, CHICAGO 6, ILL.
FOUNDRY AND FACTORY, DECATUR 60, ILL.



Clamp-Top Line Posts

(11) Lapp Insulator Co. Inc., Le Roy, N. Y.

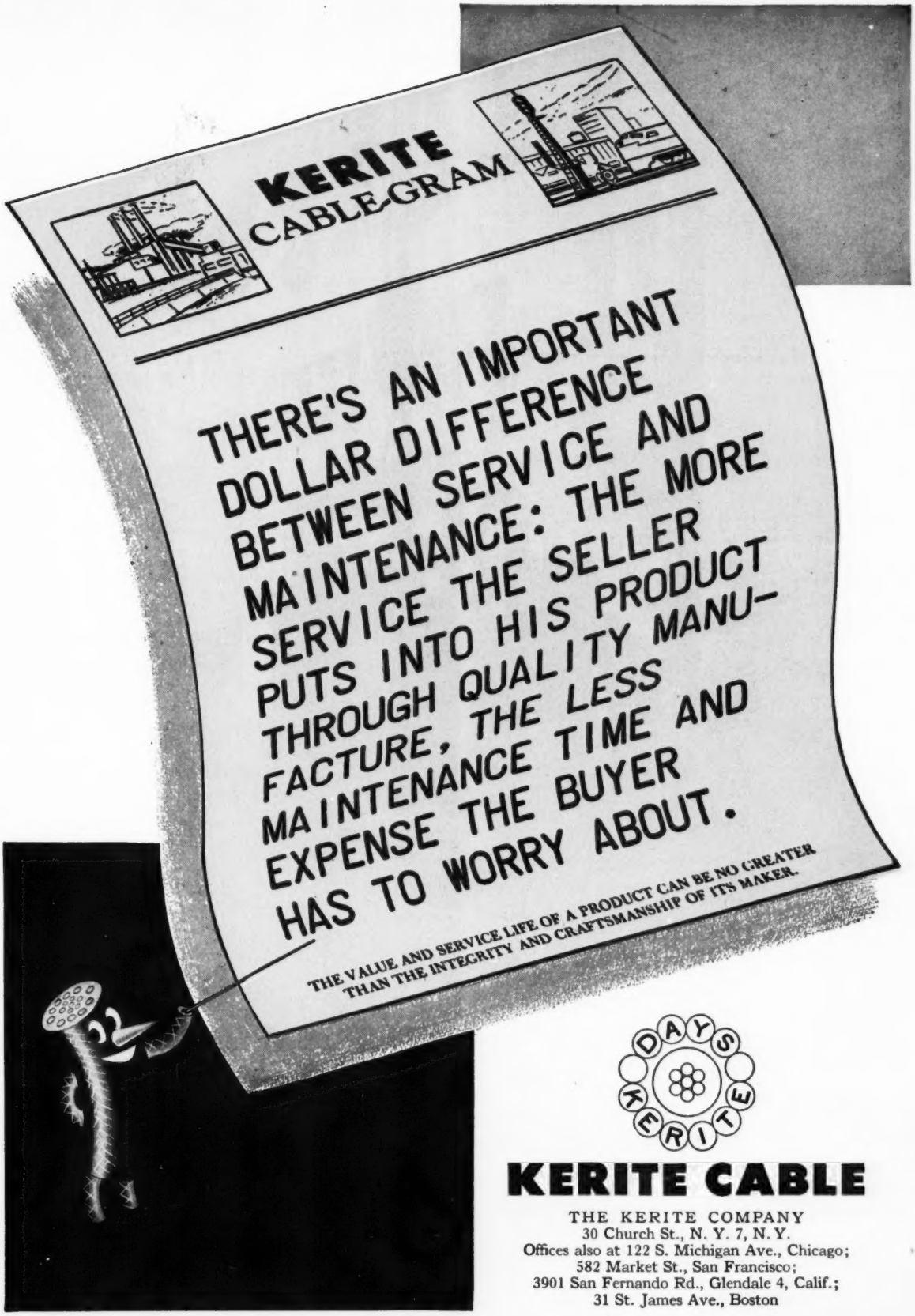
Eight ratings 20 kv to 88 kv with interchangeable clamps are included in this new line of clamp-top line post insulators for high-voltage use. In construction these insulators are similar to the manufacturer's standard line the innovation being in the addition of the clamp-top conductor tie.

These posts come with four completely interchangeable clamp sizes in ferrous or aluminum for conductor diameters from .25 to 1.50 in. They are fog-type post design and are said to be free from puncture, cracking and radio interference, with greater resistance to bullets, arc-over and dirt conditions.

The clamp top is externally bonded to the porcelain to prevent destructive cracking forces, it is pointed out. It has but one loose part per insulator throughout conductor installation. Cap screw forms one end of trunnion bearing for convenience in insulator change and is backed off, not removed. The conductor is then lifted out of position with clamp still attached.

(12) SOCKET — An all-rubber weatherproof socket is offered by Eagle Electric Mfg. Co. Inc., Long Island City 1, N. Y. It is made with No. 14 type R, UL-approved wire with ends stripped 1 in. for easy connection; has a nickel-plated screw shell and Bakelite washers, the manufacturer states. Extended lip presses onto glass of the bulb when screwed into the socket; wire enters socket body through rubber watertight sealing boots. Cataloged 145, this device is rated at 660 w, 250 v; is UL listed.

For More Data
Fill in Coupon on Page 80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THERE'S AN IMPORTANT DOLLAR DIFFERENCE BETWEEN SERVICE AND MAINTENANCE: THE MORE SERVICE THE SELLER PUTS INTO HIS PRODUCT THROUGH QUALITY MANUFACTURE, THE LESS MAINTENANCE TIME AND EXPENSE THE BUYER HAS TO WORRY ABOUT.
THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.
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KERITE CABLE

THE KERITE COMPANY
30 Church St., N. Y. 7, N. Y.
Offices also at 122 S. Michigan Ave., Chicago;
582 Market St., San Francisco;
3901 San Fernando Rd., Glendale 4, Calif.;
31 St. James Ave., Boston

READY TO START moving the 750-kva General Electric network transformer, with submersible protector, from trailer to vault. Notice the room air-conditioning units in the windows—one of the reasons why more capacity is needed here.

Potomac Electric, Washington, D.C., installs G-E network unit to meet extra-heavy load demands

System reinforced with 750-kva G-E transformer and network protector

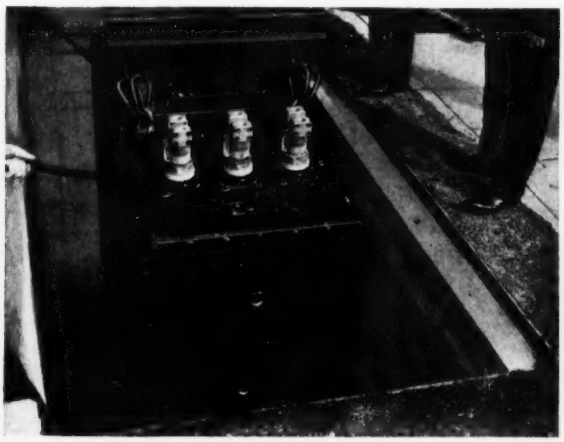
The flexibility and ease of expansion provided by a secondary network system certainly "pays off" for Potomac Electric Power Company in downtown Washington, D. C. Flexibility of the system permits load growth additions with minimum interference to service in the highly concentrated downtown area.

The financial district is experiencing a phenomenal growth and the consequent heavier load requirements, including air-conditioning in existing buildings in the area, necessitated installation of this 750-kva G-E network transformer. The unit, equipped with a submersible automatic network protector, is located at 730—15th Street, N. W., directly in front of the American Security and Trust Company building.

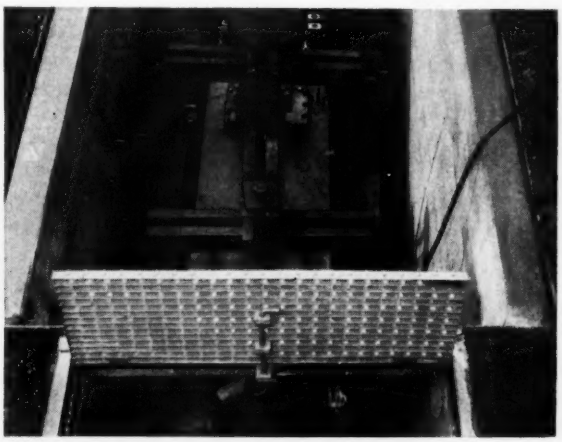
Compactness of G-E network units permits minimum vault depth (7 feet to roof slab) for lower installation cost.

It pays to start a network. Although the change from a radial to a network system means substantial initial expense, future increases in capacity require less investment with a network system. With a growing load, the sooner the network system is started, the lower the ultimate cost. Why not investigate the advantages for your system?

For help in solving your network problems, and for complete information on the many advantages of G-E standardized network units, get in touch with your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-5024, General Electric Company, Section 431-201, Schenectady 5, N. Y.



ALMOST IN PLACE and with minimum inconvenience, even in a congested downtown area. Note the G-E submersible automatic network protector on the low-voltage end of the transformer.



CENTERING UNIT in vault prior to cabling. Convenient location of cable terminals on G-E units makes minimum size vaults practical—simplifies connections for fast installation.

You can put your confidence in—

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Overhanging branches removed and trees shaped properly for Utility in Beverly Hills

SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

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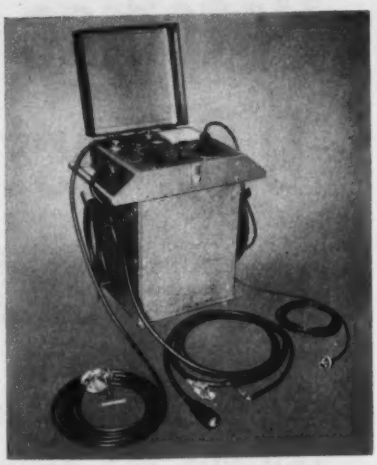

Impulse Cable Fault Locator

(13) James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.

Designed primarily for use on lead-covered cable installed in ducts, the model 4 transmitter is used also on aerial and buried cable. It has a maximum output of 15 kv d-c and a discharge capacitance of 2 muf.

This 150-lb unit requires a source of supply of about 600 va at 115 v a-c and may be used as a source of d-c voltage for proof testing of cable and other insulation. It provides a d-c over-voltage test facility that is particularly suited to cables and other electrical apparatus in the lower voltage classes, the manufacturer states. Its maximum proof testing capacity is 15 milliamperes at about .7 megohms and about 50 milliamperes at short circuit.

The transmitter can be supplied with or without the model 2 detector, which is standard equipment for locating faults by the impulse method. When the transmitter is used without the detector dependance is entirely on the sound of the discharge at the fault for its location which is impractical in most cases, especially when working with long cable, it is pointed out.

The manufacturer offers bulletin 65-11 for details.

(14) DEODORIZER — Klenz-Aire uses a 4-w ozone lamp, which has a life of about 4,000 hours with continuous 24-hour use. The device, a chrome wall fixture of tapered design, in satin diamond pattern, is 6½ in. high and has an 8-ft ivory cord and plug. It operates on 110-125 v a-c. It can be used also as a night light. General Mfg. & Distributing Co., Quincy, Mich.

(15) FLANGED ELBOWS—These elbows come in 22½° and 45° bends and are flanged at each end to permit fast assembly of wireway sections, the manufacturer states. Literature is available from Keystone Mfg. Co., 23328 Sherwood Ave., Center Line, Mich.

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twice

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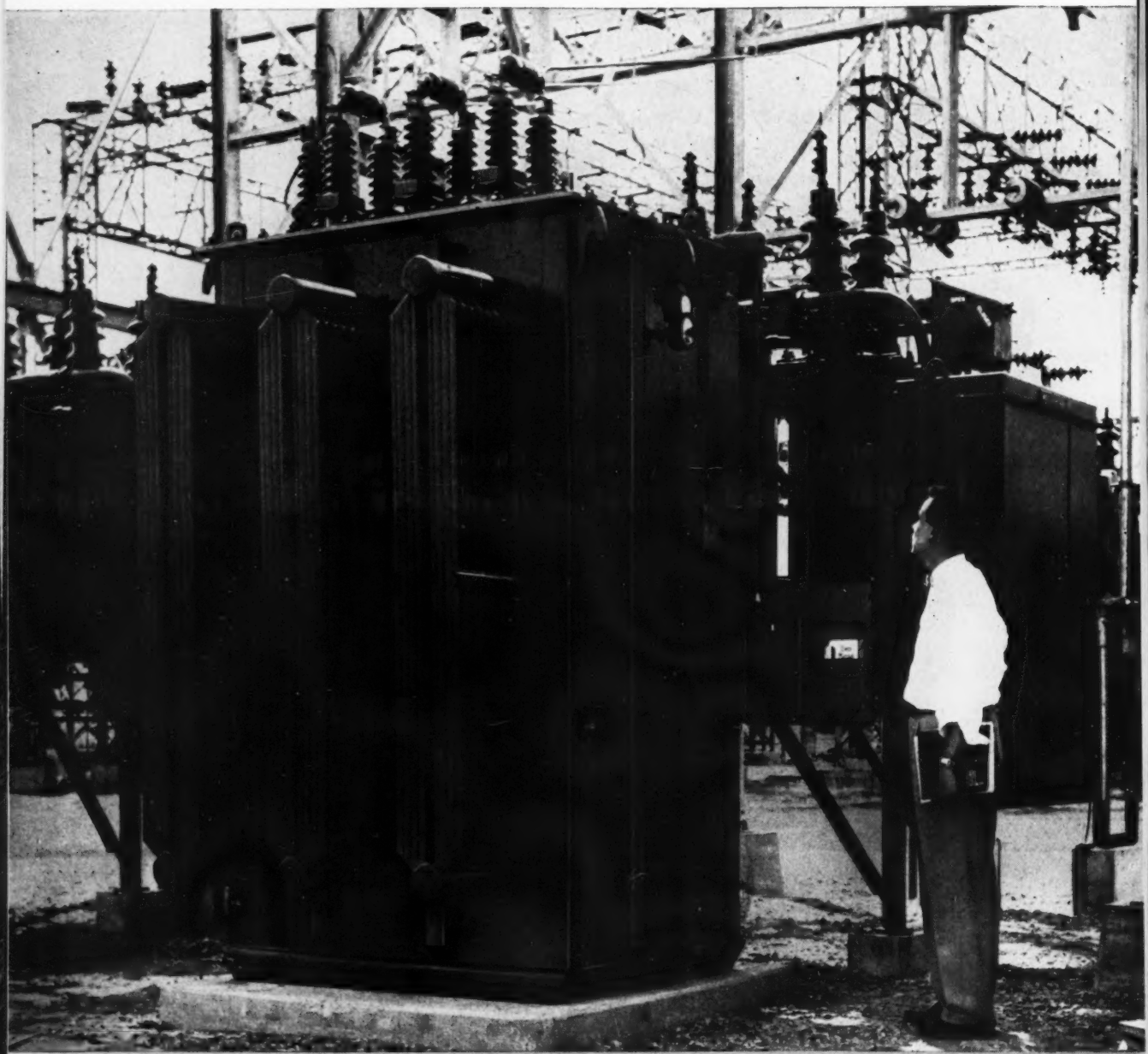
Globe's name on industrial lighting units has always meant conformance with maximum specification and performance standards. Authorized use of the RLM label by Globe, now gives added assurance of: better performance, long life, sustained lighting efficiency and economical operation. Write for details on Globe's "5100" series, RLM industrial lighting units.

Globe Lighting Products Inc., Los Angeles: 2121 South Main Street
New York: 1710 Flushing Ave., Brooklyn

How Simple Design Cuts



High Quality Construction

Tap leads from the winding are brazed to bus bars that project through the barrier separating transformer and mechanism compartments. Double bolts secure these bus bars to the dial switch terminals so that neither electrical nor mechanical vibration can work them loose. The barrier supporting the bus bars is well below oil level for maximum dielectric strength.

Quick-Break Mechanism

The *Quick-Break* mechanism is built to withstand severe operating conditions without servicing. All moving parts — even the driving motor — operate under oil. There is nothing to lubricate or adjust. Universal couplings between operating mechanism and dial switches eliminate danger of misalignment. Every nut and bolt is securely locked. 20 years of field experience prove its value.

Cost of Regulation . . .

★ **Improves Quality**

★ **Provides for Long Life**

★ **Simplifies Maintenance**

ALLIS-CHALMERS
5/8% STEP VOLTAGE REGULATORS

THE SIMPLE DESIGN of Allis-Chalmers three-phase power regulators solves the problem of lowering regulation costs. Thanks to simplicity, you get highest quality regulation with an absolute minimum of maintenance. You get ± 1 volt band, Class I accuracy, 20% range of regulation, and many famous Allis-Chalmers features.

Unit Construction Improves Quality

Unit construction keeps workmanship quality at a high level. All connections are made before the unit is tanked. Thus work is done while parts are readily accessible and easily inspected. Unit construction also permits continuous leads from transformer coils to the double-bolt terminals on the dial switch, eliminating a total of 78 connections required in other designs.

Feather-Touch Control

Simplicity also extends to the control — the famous *Feather-Touch* control feature. This control has fewer operating components than any other regulator control. Operation is easy because control components are calibrated. Voltage band and voltage level can be set in less than a minute.

Simple, Rugged Tap-Changing Mechanism

The *Quick-Break* tap-changing mechanism is another major reason why Allis-Chalmers three-phase power regulators have built up their excellent operating records over the past twenty years. It provides fast tap changing without shock, since it operates on the balanced spring principle, snubbing fast-moving parts to a quick standstill after a tap change. This field-proved design requires virtually no maintenance.

It pays to investigate all the high quality features of Allis-Chalmers 5/8% step regulator design. For more details, contact the A-C district office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4126

ALLIS-CHALMERS

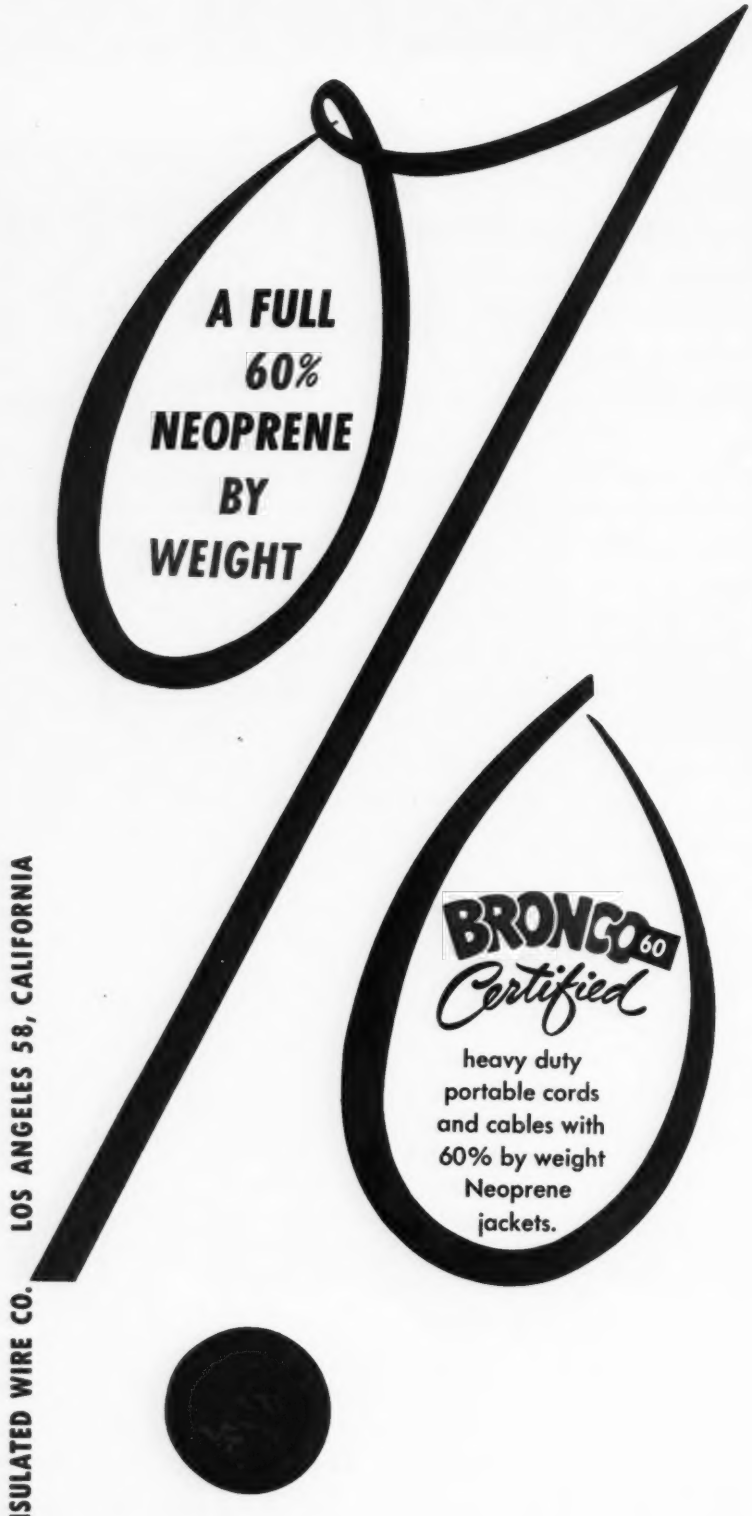
A-C ALLIS-CHALMERS

Originators of 5/8% Step Regulation

Long-Life Contacts

Four factors add to contact life: (1) contacts are large; (2) they are manufactured with arc-resisting material; (3) small 5/8% steps reduce the amount of kva to be interrupted; and (4) fast, clean contact separation provided by the *Quick-Break* tap-changing mechanism snaps the moving contacts from one position to the next before there is time for damage to occur.

Ratings Available	Through 2500 Kva Up to and Including 69 Kv



Motor Auxiliary

(16) Motor-X Products Co., P. O. Box 26, Station O, Cincinnati 8, Ohio

Designed to operate a three-phase squirrel-cage induction motor from a single-phase power supply, this device is said to be applicable for locked rotor and breakdown torques up to approximately 200% of rated full load torque and capable of from one 15-second start to 60 one-second starts per hour. These units are used with wye-connected motors.

Standard units, available in 1-hp to 10-hp ratings, operate a 200-v, 60-cycle motor from a conventional 230-v, 60-cycle, single-phase lighting circuit. Class 1 units, for use with motors that start unloaded, are designed for minimum starting current. Class II units develop approximately 200% starting torque at approximately 15% higher starting current than class I units. Special units for larger horsepower can be furnished.

All units include branch circuit and motor running overcurrent protection, a disconnecting means and motor controller. For manual starting no other switches, fuses or starters are required. For remote or automatic starting or no voltage release a magnetic contactor, and for reversing operation a drum switch or reversing contactor may be installed between the motor and the Motor-X unit.

Voltage Regulator

(17) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

An improved type SU induction voltage regulator is lighter and dimensionally smaller.

Mechanical adjustments have been eliminated from the control and the type SJ voltage regulating relay is used in the new all-electric control. This relay has no pivot or guide bearings to require frequent maintenance and has operated 100,000,000 times on test with no recalibration required, the manufacturer states.

All relays are now mounted on the back of a swinging panel to facilitate periodic inspection. A hand wheel at the upper end of the vertical motor shaft is designed to permit easy hand operation. A vertical terminal board has connections for either series or parallel operation of the secondary winding.

For Bulletins, Fill in the Coupon on Page 80

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol OC Turbine Oil

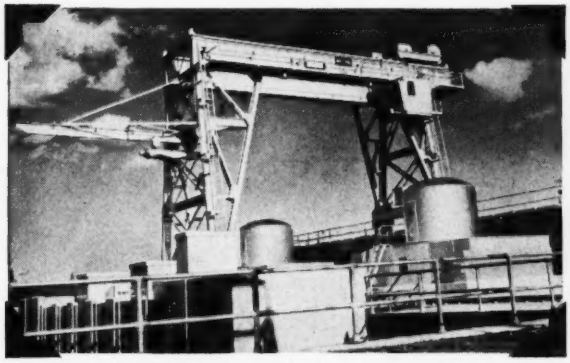
UNIT 9000 KW hydroturbines

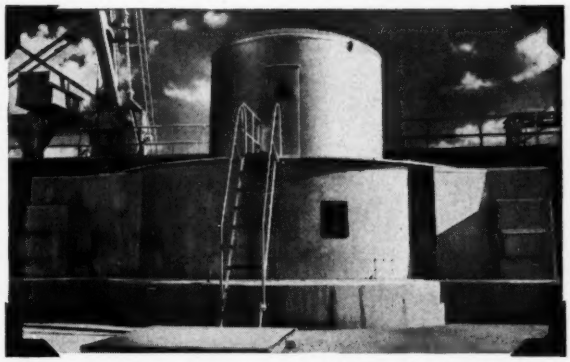
PERIOD 7 years

LOCATION Upper Salmon plant

FIRM Idaho Power Co., Boise, Idaho

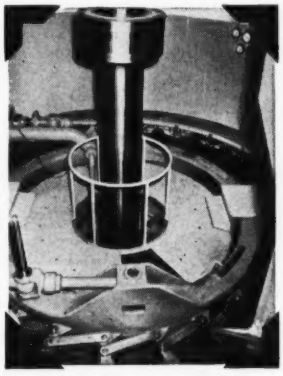
Inhibited oil ends sludge and corrosion problems!





CHARGED WITH CALOL OC TURBINE OIL in 1945, these 9,000 KW hydro-turbines have had no trouble with deposit formation or rusting since that time. Other oils tried resulted in oxidation, the use of too much makeup, foaming of oil and deterioration of insulation. The charges of Calol OC Turbine Oil still filter clear and tests, after 7 years of service, show no increase in acidity. Located at the Upper Salmon Falls on the Snake River, this plant is one of fifteen owned by the Idaho Power Company, Boise.

TURBINE SHAFT and wicket-gate mechanism in one of the units are shown at right. Thrust bearing in the turbine is immersed in a 1,000 gallon basin of oil and carries a load of 755,000 pounds. The Idaho Power Co. has been using Calol Turbine Oil in their plants since 1935.



REMARKS: Extremely wide operating temperatures exist at this plant, varying, at times, from sub-zero to over 160°F.

How CALOL OC Turbine Oil prevents sludging, rusting and wear

A. Excellent metal-wetting ability keeps CALOL OC Turbine Oil on bearings and gears under the heaviest loads—assures constant lubrication.

B. Oxidation inhibitor resists highest operating temperatures; prevents sludge, gum and lacquer formation on parts and in oil systems.

C. Corrosion inhibitor stops rusting even in initial turbine operation, stops the action of both fresh and salt water.

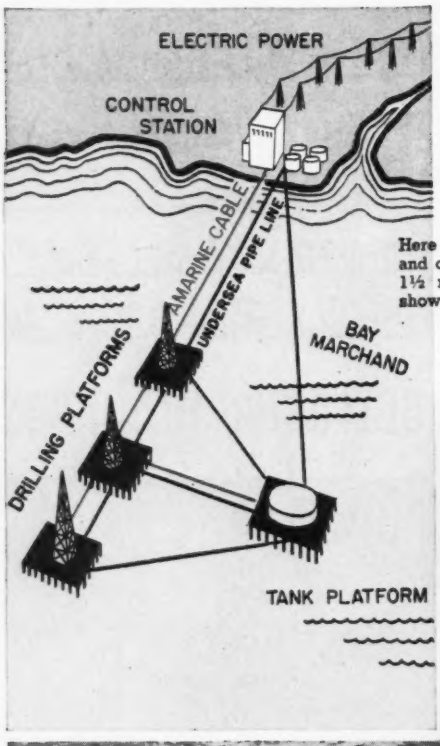
FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, is ready for you. Write or ask for your free copy today.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

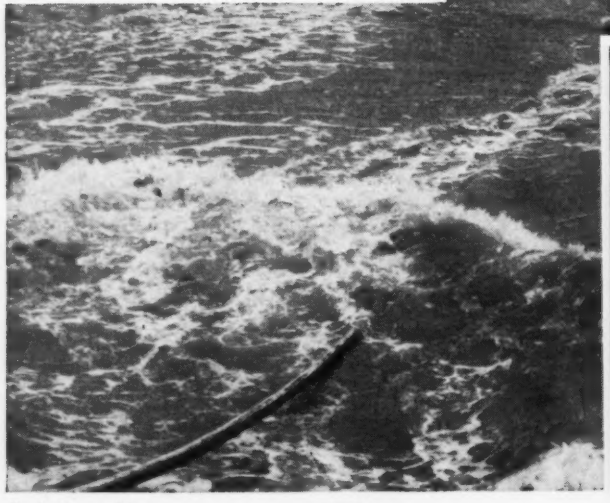
STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

STANDARD OIL COMPANY OF CALIFORNIA

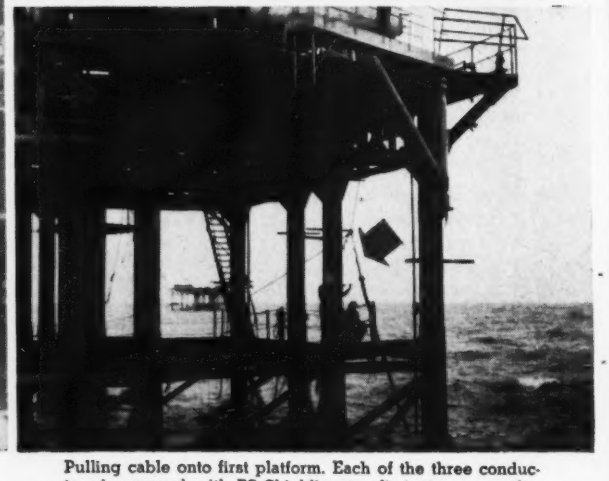


Here is layout of drilling platform and cable supply. Rig D is about 1½ miles from shore. Red line shows cable connections.

The first case 4 miles of powers



Anchoring cable on shore. Power is supplied at 13,800 volts. Entire cable is armored with galvanized mild steel wire to provide strength, resist abrasion.



Pulling cable onto first platform. Each of the three conductors is covered with PS Shielding to eliminate corona discharge.

AMERICAN STEEL & WIRE DIVISION
USS MARKS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

A STANDARD CABLE FOR

▼ asbestos wire and cable ▼ shovel & dredge cable
▼ paper & varnished cambric cable
▼ aerial, underground & submarine cable

U·S·S AMERICAN ELECTRICAL

of its kind... Amarine Submarine Cable off-shore drilling rig

• It isn't easy to operate an off-shore drilling rig in the Gulf of Mexico. Fog, northwesters and water spouts are common hazards. Hurricanes are the worst of all.

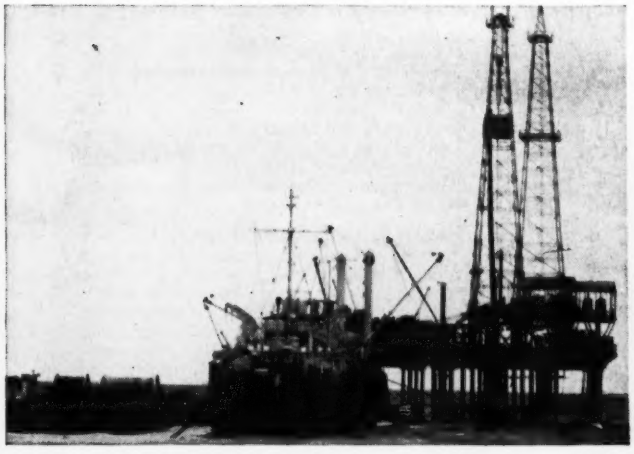
In the face of these difficulties, the California Company brought in 10 producing wells a mile or more from shore. A converted LST supplied power to the pumps—but it was vulnerable to bad weather and it was needed elsewhere, for other drilling operations. What was needed was a *reliable* way to get commercial power out to sea.

American Steel & Wire designed a special non-leaded 3-conductor submarine cable that transmits some 2,500 horsepower to the drilling platforms. In just a single day, it was carried out to the first platform. It is totally unsupported, and lies on the bottom of the Gulf, safe from wind and sea. Now the pumps are operated round the clock with reliable shore power.

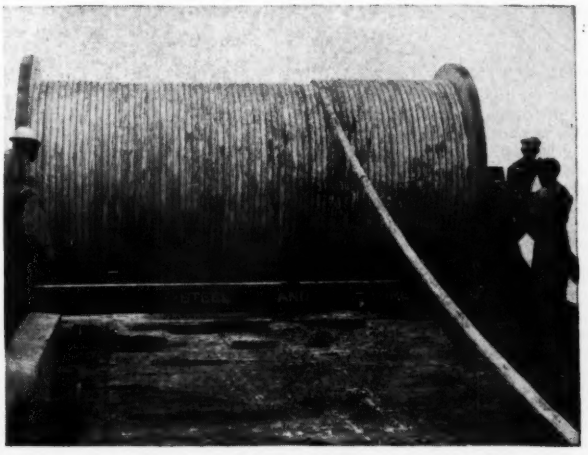
It's the tough jobs like this that have made U·S·S Amarine Submarine Cable famous. And remember, too, that you can get a standard U·S·S American cable for every special job, whether it's for a mining locomotive, dredge, power shovel or a hand-operated electric drill.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Here is typical rig. Notice LST in center, cable barge at left. Cable contains three pairs of telephone wires to communicate between drilling rigs and shore.



Cable was shipped on two reels—12,970 feet on one, 6,500 on the other. We have shipped another 6,000 feet of same cable to join new drilling rigs.

EVERY SPECIAL JOB!

▼ mold cured portable cord
▼ machine tool & building wire
▼ special purpose wire & cable

WIRE & CABLE

USS

SEND THE COUPON

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Room JE-83, Rockefeller Building, Cleveland 13, Ohio

☐ Please give me more information on U·S·S Amarine Submarine Cable.
☐ Have representative call.

Name.....
Title.....
Company.....
Address.....
City.....State.....

UNITED STATES STEEL

SHAWMUT'S NEW FORM 208 Amp-trap®

SAVES BOTH CIRCUIT AND CUSTOMER
(FOR 120/208 VOLT AC OR 125/250 VOLT DC NETWORKS)

POSITIVE PROTECTION AGAINST SUPERCURRENTS

Low voltage AC and DC networks give large utilities and their customers greater continuity of service and easy expansion of their systems. The only drawback to this type of network is the constant threat of danger from heavy short-circuit or fault currents. Shawmut's new FORM 208 Amp-trap eliminates this danger from these circuits. On actual test, its amazingly fast "chop-off" stops a short-circuit *even before it reaches the peak of its first ¼ cycle — even if the available peak current could reach* 560,000 *Amps!* It anticipates and prevents the destructive build-up of heavy fault currents so dangerous to office buildings, stores, hospitals, theatres, schools, etc. FORM 208 saves *both* circuit and customers.

USES & SPECIFICATIONS

Amp-trap FORM 208 is made for Entrance Switch Service, Underground Network Conductors, Distribution & Panelboards and other applications. It is built in Ampere ratings of 1000, 1200, 1600, 2000, 2500, 3000, 4000 and 5000 for Entrance Switch Service and for cable sizes from 4/0 to 1000 MCM. It runs "cool" and carries 100% of its rating with temperature rises less than those recommended in the Underwriters' Laboratories Standards for Fuses. The watt (power) loss is probably lower than for *any other over-current protective device.* Hence it may safely be installed in vaults and steel enclosures and subjected to long continued loads.

LOW IN COST — EASY TO INSTALL

FORM 208 Amp-traps clear fault currents long before they can burn or wreck bus bars and switch gear. Yet they are small in size, low in cost and easy to apply. They have a variety of mountings for flat, bus or tubular connectors. Adapters can be supplied for switch cubicles now equipped with copper or aluminum alloy links. FORM 208 is the "little brother" of the famous FORM 600 Amp-trap which has long been used so successfully on 600 volt circuits. Write today and find out about FORM 208 at once.

208
WITH TUBULAR TERMINALS

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OUR 60 YEARS — FROM EDISON TO ELECTRONICS

208 AMP-TRAP — "Awake At The Switch"

THE CHASE-SHAWMUT CO.

385 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Amp-trap Tri-onic -td- C-O-T Trionic OTT O-T FUSE WIRE

Tubing

(18) General Electric Co., Pittsfield, Mass.; Bentley, Harris Mfg. Co., Conshohocken, Pa.

An improved line of class H Fiberglas tubing and sleeving uses G-E's recently developed SE-100 silicone rubber coating. This insulation is made in 27 sizes by Bentley, Harris from braided Fiberglas coated with the compound.

Features claimed are unusual dielectric strength, flexibility throughout life of equipment. Its electrical and physical properties are not affected by continuous operation through a temperature range of minus 90 to 400 F, according to the announcement, and it will withstand 450 F for 96 hours, 500 F for four hours and 600 F for 15 minutes.

The silicone coating gives BH 1151 an average minimum electrical breakdown ranging from 7,000 v for NEMA class H-A-1 to 1,500 for class H-C-2. Electrical resistance is 100,000 megohms after 48-hour tests at 25 C and 50% relative humidity. It is stated that the material can be twisted and bent without crazing or cracking or losing electrical strength.

(19) HEAT TREATING FURNACE — Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa., has a new metallurgical heat treating furnace that will obtain temperatures up to 3,100 F. A water-jacketed chamber permits work to be cooled as well as heated in a protective atmosphere. The furnace is designed for use of either hydrogen or dissociated ammonia. Protective atmosphere consumption is between 150 and 200 cu ft per hour.

(20) PLASTIC ANCHORS — Two new plastic anchors are designed for use with ⅜-, 7/16- and ½-in. lag screws or corresponding wood screws and may be used in any material that can be drilled and will support expansion as specified by the manufacturer, Holub Industries Inc., Sycamore, Ill. They are UL approved for indoor and outdoor use; are sold under the trade name Sand*Scott. Laboratory pull tests show a holding power of two tons in concrete, the manufacturer states.

(21) FITTING—A new fitting for liquidtight flexible conduit mates with any conduit spiral and does not have to be taken apart when installed, according to its manufacturer, The Thomas & Betts Co., Elizabeth, N. J. It is claimed to be well suited for machine tool wiring or other similar electrical circuits exposed to corrosive liquids and mineral oils. It comes in straight, 90° and 45° elbow designs and accommodates conduit from ⅜ to 2 in. trade size.

For manufacturers' bulletins with additional information on these products, fill in coupon on page 80.

BULLDOG BUStribution® DUCT

10 feet - or 10,000

You can use a single standard 10-foot section of BullDog Plug-in BUStribution DUCT to do the work of a switchboard, or purchase any desired length to provide flexible, plug-in power for lighting and other circuits.

You can add sections without limit. For this duct's absolute flexibility and salvability enables the BullDog Plug-in BUStribution DUCT System to grow or change as conditions require.

With BullDog Plug-in Duct, too, you are assured of maximum installation speed and economy, made possible by the exclusive BullDog scarf-lap joint. Sections clamp together smoothly, quickly, rigidly. Bulky, complicated, time-consuming joint fittings are eliminated.

For complete details, write BullDog Electric Products Company, Dept. EW83, Detroit 32, Michigan; or contact your BullDog Field Engineer—located in all principal cities.

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TRANSFORMERS

All Sizes through 750 KVA

Illustrated is Floor Mounting Type CF, 10 through 300 KVA. Furnished with removable plates in sizes 100 through 300 KVA.

Illustrated is Wall Mounting Type CW, 7½ through 15 KVA. Also available in 5 KVA.

Illustrated is Wall Mounting Type EM, 50 VA through 3 KVA. Similar Type EMD (not shown) furnished in 5 KVA single phase, and 100 VA through 5 KVA 3 phase.

BURTON

Built to ASA and NEMA Standards

Burton Transformers are meeting the most severe tests with dependable, trouble-free service.

BURTON

EQUIPMENT CO., INC.

P.O. Box 631 4810 Firestone Blvd.
South Gate, Calif. LOgan 8-3151

BULLETINS ETC.

(22) DUCT—A data sheet on its Oct-O-Duct is being offered by Soapstone Duct Co., 110 Linfield Drive, Menlo Park, Calif. This duct is flat sided and octagonal in design; is claimed to cut field costs on handling, spacing and alignment in the trench.

(23) POLES—In a folder entitled "The Big Three in Western Poles" J. Neils Lumber Co., Pole Division, Libby, Mont., gives facts about Western larch, Douglas fir and lodgepole pine. Estimated life, fiber stress and other data are given.

(24) CARRIER TERMS—Definitions of 150 terms commonly found in telephone and telegraph carrier equipment literature are given in bulletin EB-101 issued by Lenkurt Electric Co., 1107 County Rd., San Carlos, Calif.

(25) TELEMETERING—Information on Metameter instruments for remote recording, indicating and totalizing of electric variables is given in bulletin M1710 prepared by The Bristol Co., Waterbury 20, Conn.

(26) DISTRIBUTION TRANSFORMERS—Ratings of 167 kva and smaller, 15,000 v and below are described in a distribution transformer bulletin, 61B6159D, published by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

(27) MANUAL—Installation, operation and maintenance of feeder voltage regulators, type AFR and DFR, are covered in a manual prepared by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. The manual is designated 01X7002B.

(28) BUS DUCT—Application to distribution systems of commercial, institutional and industrial buildings is described by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa., in a 12-page booklet, B-5835. Four types of bus duct are described: plug-in; low impedance; weatherproof feeder; weatherproof low impedance.

(29) CUTOUTS—A 16-page bulletin, No. 530C, describes the complete line of open-type dropout cutouts made by Southern States Equipment Corp., Hampton, Ga.

(30) MOTORS—Wound rotor motors, ½ to 1,000 hp, are covered in bulletin 1300 offered by Louis Allis Co., Milwaukee 7, Wis.

(31) KILNS—L & L Mfg. Co., Chester 42, Pa., is offering a catalog and parts manual for 37 models of Dyna-Kilns and Dyna-Kiln electric furnaces.

(32) MOTOR-GENERATORS—Units from ¾ to 1,500 kw are described in a bulletin offered by The Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio.

(33) OUTDOOR LIGHTING—A new line of garden and residential outdoor lighting units is covered in bulletin 135-53 from Steber Mfg. Co., Broadview, Ill.

(34) VARNISHES—Baking and air-drying types of Tuffernell insulating varnishes are covered in an 11-page booklet, 65-120, offered by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

(35) SUPPORT—Fast-Lok Mfg. Co., Ash St. at Bedford, Bridgeport 5, Conn., has issued catalog material on its new single-arm support for carrying outlet boxes and conduits above hung ceilings.

(36) MEASURING EQUIPMENT—A revised edition of its measuring equipment catalog has been issued by General Electric Co., Schenectady 5, N.Y. The 64-page booklet, 1016A, lists 115 devices.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after October 1

Please send me, without obligation, the new product information or catalogs described on the following pages and identified by numbers circled below:

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*Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Victor No. 9 Pintypes undergoing routine electrical flashover, visual inspection, and final check for pinhole thread accuracy.

PINTYPE INSULATORS

Must Pass These Tests!

VICTOR NO. 9
LOW VOLTAGE
PINTYPE

1. **ROUTINE ELECTRICAL FLASHOVER**
   Every Victor pintype undergoes a routine electrical flashover test before shipment to insure trouble-free service.
2. **ACCURATE PINHOLE GAGING**
   Every lot of Victor Pintypes must be able to pass the standard NEMA test for pinhole thread accuracy.
3. **CAREFUL VISUAL INSPECTION**
   The finished insulator is thoroughly inspected for general appearance with special attention to smoothness of conductor and tie-wire grooves.

These tests assure almost unheard-of uniformity of service . . . unequalled ease of installation of pintypes. These features, coupled with the greater hardness, strength and resistance to impact of Victor *Purified Porcelain*, make Victor Pintypes the power man's best buy.

FREE BOOKLET gives you the full story on how Victor Insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

Specify VICTOR INSULATORS

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain

ELECTRA'S HUSBAND

BUCK PASSING BEHIND THE LINE

"I'M ashamed to sell any of my friends an appliance and charge them the full retail price," one of our town's biggest dealers said at the luncheon table one day recently. "It's true that only a sucker or a sap doesn't know somebody or someplace where he can buy almost anything wholesale. Would anybody like to buy me out?"

The only sound was the rattle of knives and forks as the group of ten continued eating. Finally one of the distributors spoke up:

"Don't think that we aren't sympathetic, because we are in a bind also. How would you like to buy us out? If something doesn't happen soon to control prices and discounts and channels of distribution, we won't stay in business either. Appliances will move from the manufacturer directly to the customer."

"Where does the trouble come from—discount houses?" I asked.

"That's only a part of it," the dealer answered. "Buying clubs, unions, company purchasing departments, distressed dealers—you can buy from half a dozen sources and not pay retail prices. From a half to two-thirds of all the appliances sold in this community go for less than list. Only the chains are selling branded merchandise for the full price. I can stand in the corner window of my office with a 22-rifle and shoot the windows out of ten places where people can buy almost any item on my floor for five per cent more than it costs me."

"Don't look at me," the distributor wailed dismally. "They don't get any of their stuff from us. Why we are under terrific pressure from some of the biggest industrial organizations in this area to sell their employees' buying clubs appliances at wholesale. We won't do it. In fact we have lost orders for supply items from some of the electronic manufacturers because we refuse to allow them to purchase appliances.

"And neither one of you can blame us," one of the manufacturers present protested lustily. "We don't sell any of those groups. The appliances they get must come from some distributor or dealer who is overstocked or who needs cash to meet a financial obligation. Those deals bounce back on us even harder than they do on you fellows. Let me tell you about one case.

"The president of the biggest employees' buying club in this area—and you'd be surprised if I named the company—purchased one of our automatic washers through the club. It was delivered in the original container with only the name of the original dealer or distributor to whom it had been sent carefully scraped off the carton with a sharp knife. There was no guarantee, no installation instructions, no operating manual—nothing.

"Well the chap who bought the washer called our franchised dealer on the phone and asked him to come up and install and demonstrate the appliance. The dealer did come up, saw the name of the buying club on the carton, asked a few pertinent questions and then announced that he was sorry but he could not install the device. Since it had not been purchased from him, he had no responsibility."

"Three cheers for him," our dealer said. "What happened then?"

"Plenty," the manufacturer continued. "The chap who bought the washer wrote the president of our company on his company's letterhead. He reported that he had purchased one of our appliances which our franchised dealer refused to install or demonstrate. He wanted to know if that was the policy of our company and he thought he was entitled to some redress. There wasn't a word in the letter about how he bought the washer or why the dealer didn't perform.

"So now the case is in my lap—from president to vice-president to yours truly, one of those Tinker-to-Evans-to-Chance deals. How do I fix it up? The president of the buying club is convinced that the sale to him is perfectly legitimate. The appliance has our brand on it. He says the responsibility for performance is ours."

"Where did the buying club get the appliance?" the dealer asked.

"Not from us," the distributor sputtered.

"Look," I interrupted, trying to pour a little oil on waters that threatened to get really rough, "it doesn't matter who is responsible for what in this instance. The real problem is what ultimately happens to everybody in this picture. You, Mr. Dealer, say that you can't continue to operate with competition of this kind. You, Mr. Distributor, say that the same fate threatens your business. My own feeling is that somewhere along the line our industry's salesmanship is at fault. Either that or our goods are greatly overpriced. But personally I think it's our selling. You admitted in the beginning that the chains are having no trouble. They sell and sell and sell."

"We can't afford to sell the way we did in years gone by," the dealer interrupted. "The squeeze between high overhead and low margins doesn't leave enough for hiring good salesmen, even if we could get them. There aren't any real salesmen to be had. With proper margins maybe we could find and train capable salespeople."

Up to this point the contractor member of our group had been silent. Now he joined the discussion.

"You're dead right," he said. "The way our margins have been reduced is scandalous. A few years ago our lighting sales were $30,000 a year. Now they're hardly $3,000. We once sold $100,000 of motors and controls annually. Now we don't sell any. Why? Because margins are five or 10%. The maximum margin on any item we are supposed to sell is only 17%. Our overhead ranges from 22% to 27% depending upon the particular department. So we don't sell any more."

A new fuse was touched off. For more than an hour the discussion wore on heatedly. "We can't," "you don't" and "we won't" were heard over and over again. Somebody else was always to blame.

Later that day I was telling Electra about the conversation.

"Gee, I thought your industry was noted for cooperation," she commented. "It *was*," I said.

How Moisture is Kept Out of Transformer Coils

Fast sequence from drying oven into tank is one reason why you get consistently excellent insulation quality in Allis-Chalmers distribution transformers.

Here's How It's Done

Core and coil assemblies move continuously through the tunnel-type electrically heated oven partly shown in the background above. Then . . . immediately after the drying cycle is complete . . . they are immersed in dry oil in their own tanks. This prevents any absorption of moisture that might have occurred if the cooling had been done in air. Then a vacuum drawn on the transformer removes any air entrapped in the oil.

Finally, Production Line Impulse Testing

As a final step, production line impulse testing is used to assure uniform high insulation strength.

Get All Benefits

Careful attention to manufacturing detail is only one of the many reasons why you benefit when Allis-Chalmers distribution transformers are on your system. For complete information, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wis.

A-3977

ALLIS-CHALMERS A-C ALLIS-CHALMERS

No flame is in contact with the insulation in this photo, but the old type held by N. Arone, Development Engineer, G-E Switchgear Laboratory Engineering Dept., continues to burn. The new flame-retardant insulation held by H. F. Hentschel, Mgr. Medium-voltage Switchgear Dept.—while charred—stopped burning as soon as flame was removed.

Self-extinguishing switchgear insulation—
NEWEST CONTRIBUTION TO SYSTEM CONTINUITY

New G-E self-extinguishing insulation barriers help protect the breaker in this metal-clad equipment.

Mica-mat, another significant G-E development, is now used in certain transformers and in traction motors.

The possibilities of insulation failure, however remote, are ever present in high-voltage electrical apparatus.

Abnormal conditions such as mechanical damage from external causes; subjection to short-circuit duty in excess of rating; excessive lightning surges on inadequately protected lines; all may cause insulation fires in electrical equipment.

A new laminated, flame-retardant insulation—developed at the G-E Switchgear Department in Philadelphia—is a further forward step towards minimizing potential fire hazards. This new insulation incorporates a self-extinguishing characteristic that refuses to sustain combustion. It will burn and char *only* if a source of flame remains in contact with the insulation itself. Once the source is removed, polyvinylchloride "smothers" the flame in less than a minute, localizing damage and permitting quick access to equipment for inspections and maintenance.

To the electric utilities concerned with the generation and distribution of increasingly larger blocks of power, insulation developments such as flame-retardant and mica-mat represent a means of providing even greater service continuity. The use of this new insulation in such apparatus as circuit breakers, metal-clad equipment, power transformers and similar vital apparatus will do much to eliminate equipment failure under abnormal conditions. General Electric Co., Schenectady 5, New York. 301-235

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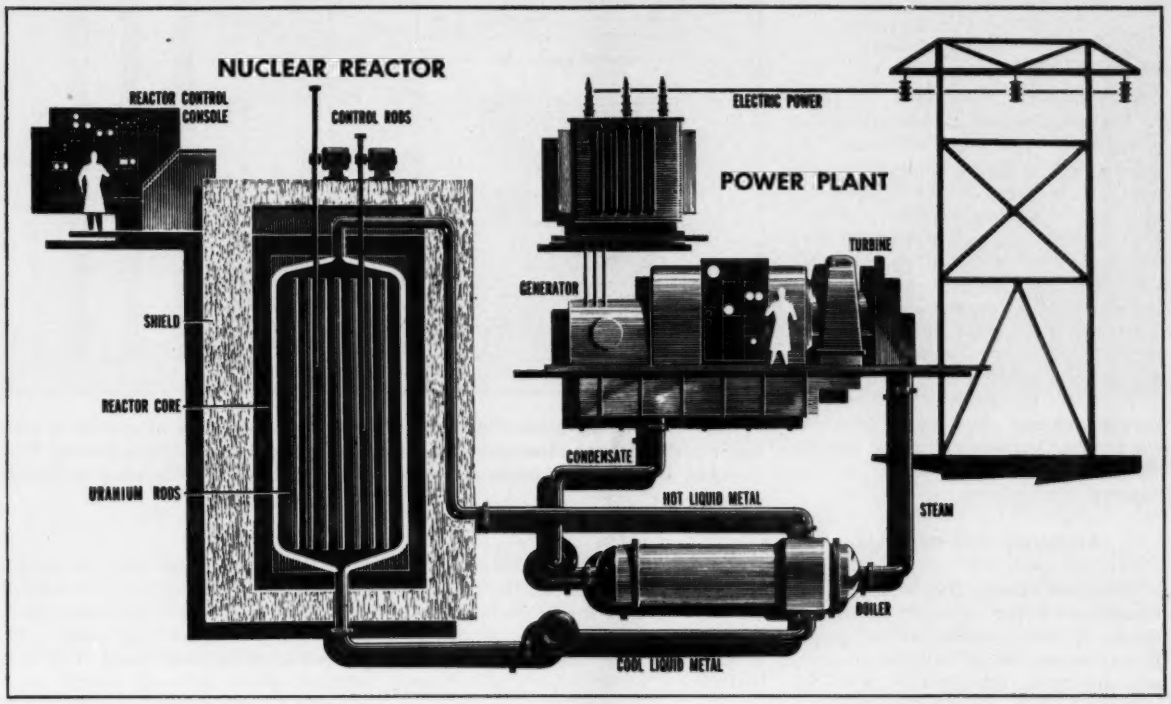


Experience to be gained from a pilot plant like this schematic leads scientists of North American Aviation to believe that . . .

Six-Mill Atomic Power Is in Sight

Dr. Sidney Siegel

Associate Director
Atomic Energy Research Department
North American Aviation Inc.
Downey, Calif.

This article stems from the announcement by North American Aviation that it has designed an atomic power plant and is ready to build a $10,000,000, 8,000-kw pilot plant to demonstrate and study the production of electric power. "We can build a pilot plant on the basis of our design using our engineering and production facilities and starting at once," states J. H. Kindelberger, chairman of the board.

During the past years there have been numerous discussions of the economic utilization of nuclear energy for central station electric power. The consensus appears to be that nuclear sources may furnish a substantial fraction, say one-fourth, of the national electric power output within about 25 years. This opinion is based on three major facts:

1. Measured in terms of energy available, nuclear fuels, natural uranium and thorium, are *plentiful*.

2. The cost of nuclear fuels, in terms of their energy content, is *low*.

3. While present nuclear power plants are expensive, technological developments will result in investment and operating costs comparable with conventional plants.

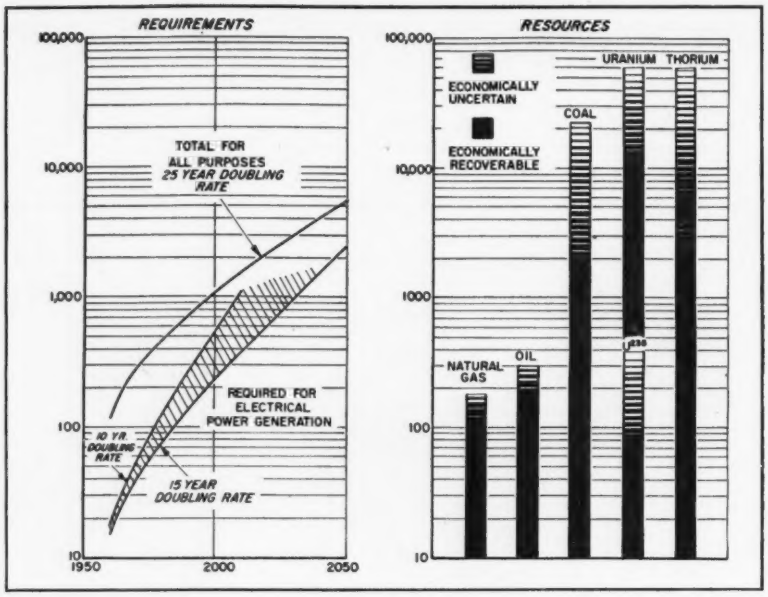
The discovery that uranium can be caused to undergo nuclear fission by the absorption of a neutron, followed by the discovery that several neutrons are released in the fission process itself, made nuclear chain reactions possible on a practical scale. Assemblies of fissionable and other material can be constructed in which nuclear fission of uranium proceeds in a controlled manner on a large scale.

In these machines, nuclear reactors, the process that goes on is essentially a nuclear fire. The fuel, U^{235} or another fissionable material such as U^{233} or Pu^{239} (plutonium), is burned with neutrons playing the role of the oxidizer,

$$U^{235} + n \longrightarrow \text{two fission fragments (e.g., La and Br)} + 2.5 \text{ neutrons} + \text{heat}$$

The neutrons released by the fission event cause additional U^{235} nuclei to fission, and so the chain reaction proceeds. The great difference between the nuclear fire and ordinary combustion is in the amount of heat released per mole of fuel consumed. In terms of weight, the complete combustion by fission of a pound of uranium releases about 10,000,000 kwh of energy, while the burning of a pound of methane releases about 7 kwh of energy.

It is this tremendous difference in energy content that has excited the interest in the potentialities of nuclear energy as the power source of the future.



U. S. thermal energy balance integrated from 1950 on. Units are in trillions of kwh. Lower portion of bar showing uranium resources is amount of easily fissionable U^{235} available. Uranium and thorium reserves shown are available if breeding is possible

Availability of Nuclear Fuels

Projected energy requirements and resources of the United States are shown in the accompanying graph. Requirements for all energy purposes are shown in the upper curve, for electric power alone in the dashed band. The upper bound on this band assumes a 10-year doubling rate, which we are experiencing at present, the lower bound a more conservative 15-year doubling rate.

Resources are plotted on the same scale to the right. It is evident that the fossil fuel reserve is largely, by a factor of the order of 10, coal. The gas and oil reserves will be able to supply only a fraction of the total foreseeable demand, even if they were not reserved in the fairly near future for such special uses as domestic heating, transport, and as source materials for the chemical industries. The coal reserves will serve us for several hundred years; precisely how long is really a matter of conjecture.

The available nuclear fuels, uranium and thorium, represent a larger energy reserve than does coal. Nuclear fuels are therefore not rare curiosities, but materials available in amounts comparable to or greater than our fossil fuel reserves.

In regions such as this in the Far West, the demand for power will increase at an even faster rate than the average; there is no adequate local supply of coal, and the premium fuels such as oil and gas will soon become less available for the generation of electric power. Nuclear fuels can be expected to play a role on our power scene at an earlier time than may be the case generally throughout the nation.

Costs of Nuclear Fuels

The cost of uranium for use in a nuclear reactor is not an easily determinable quantity. The AEC pays $3.50 per pound for uranium in ores. Let us take a figure of $35 a pound for uranium in metallic form suitable for use in a reactor. The natural form of uranium contains only 1 part in 140 of the easily fissionable isotope U^{235}. Furthermore, in undergoing fission the uranium metal is damaged, and fission product "poisons" build up so that not all the U^{235} present can be burned without some sort of reprocessing of the fuel. Assuming that we can burn 50% of the U^{235} in one period of residence in the reactor, then the cost of the fuel is

$$2 \times 140 \times \$35 = \$10{,}000 \text{ per lb}$$

The fuel cost of electric power would be, therefore,

$$\frac{1}{\text{th. eff.}} \times \frac{10^4 \times 10^3 \text{ mills}}{10^7 \text{ kwh}} = 3 \text{ mills/kwh}$$

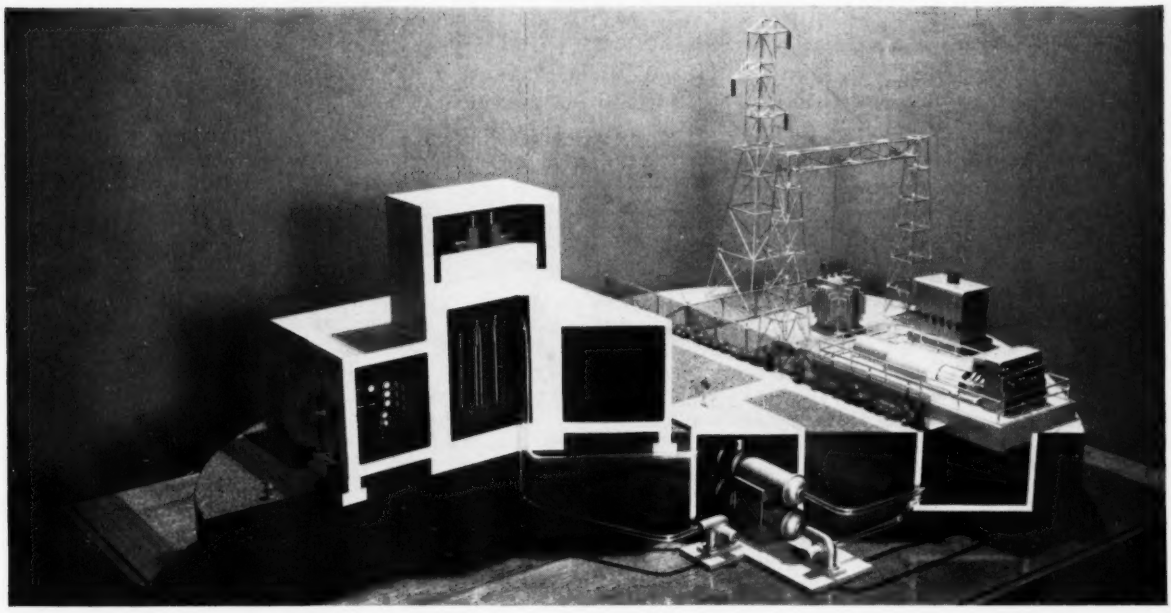
for a thermal efficiency of 30% in the steam-electric portion of the nuclear power plant. This is very nearly the same as present fuel costs in hydrocarbon fueled plants, so it is evident that the nuclear fuels are not expensive; they compare favorably with present costs of fossil fuels. The cost estimate given above is greatly oversimplified, but serves to set the scale of fuel costs.

To evaluate the costs of nuclear fuels more accurately than was done above, we must discuss these costs in terms of specific reactor configurations.

Reactor Types

A nuclear reactor in general is a structure containing the fissionable material which serves as the nuclear fuel. It may contain other potentially fissionable, fertile, material. A large fraction of its material content may be some low atomic weight material such as water or graphite to serve as a moderator. In addition there is present structural material, coolant ducts, cooling fluids to remove the heat generated, and control elements to control the rate at which the process of nuclear fission, and hence power generation, proceeds. Surrounding the whole structure, including the cooling system external to the reactor proper, is a very massive concrete shield about 7 ft thick, to attenuate the lethal radiations emitted during the fission process.

Reactors can be fast or thermal, depending on the speed of the average neutron which induces the fission of



This is a model of a proposed pilot plant designed by North American Aviation for generation of electric power. Pilot plant would cost $10,000,000 and have a capacity of 8,000 kw. Liquid metal would absorb heat produced in reactor core, left. Liquid metal is then piped to a water boiler, lower center, where steam is produced. Steam would drive conventional turbine-generator, center

the fuel. Fast reactors are generally compact, but this may lead to engineering difficulties in abstracting large quantities of heat from the reactor. Thermal reactors are generally large, but contain less fissionable material and because of their size can produce very large amounts of power. Under proper design conditions one million kilowatts can be produced in a reactor core about 10 ft in diameter and height. Both types of reactors, fast and thermal, have been proposed for the production of nuclear power.

Reactors may be classified as burners, converters, or breeders depending on the precise mixture of fissionable U^{235} or Pu^{239}, and fertile uranium or thorium that may be present in the reactors. The burner typically uses a highly enriched nuclear fuel with resultant fuel costs of about 10 mills/kwh for the power produced from such a reactor. This class of reactors is generally suitable only for military applications.

In converter-type reactors some of the excess neutrons, over and above the one required to keep the chain reaction going, available from the fission of U^{235} may be captured in U^{238} present in the reactor to produce additional fuel, Pu^{239}. The power produced in such a converter reactor has a fuel cost of about 1 mill/kwh. This is significantly lower than any present or future fuel costs. Converter reactors first of all increase the U^{235} fuel reserves by a factor of the order of 5, and possibly 20 by very careful design, and secondly can result in fuel costs of the order of 1 mill/kwh.

The third class of reactors is the breeder type. In this the fission of the fuel produces neutrons which are captured in a fertile material to produce more of the same fuel, in amounts greater than that burned. Two cases of breeding are possible. In one the fissionable material is Pu^{239}, the fertile material is U^{238} or essentially natural U. The neutrons produced by the fission of the Pu^{239} are in part captured in U^{238} to produce additional Pu^{239}. While this process can proceed in either fast or thermal reactors, there is a net gain of Pu^{239} only in fast reactors. This situation arises from detailed values of certain of the nuclear constants of Pu^{239}, and has recently been demonstrated in the experimental breeder reactor developed by Argonne National Laboratory.

Another possible case of breeding, not yet proved experimentally, involves the use of natural thorium as the fertile material, and an artificial isotope of uranium, U^{233}, as the fissionable material. It is believed that this breeding cycle can be made to proceed in carefully designed thermal reactors. This cycle would thus make available as a nuclear fuel the entire thorium reserve. A further possible advantage of the thorium cycle is the fact that in the steady state it is entirely independent of a uranium economy which is at present, and may continue to be for many years, completely tied to a weapons requirement. So far there has been no military requirement for U^{233} that we are aware of, and a thorium power cycle would thus not be competing with weapons for source material.

In these breeding cycles in principle the entire feed of uranium or thorium can ultimately be burned, not merely the U^{235} content, or possibly five times that as in a converter. The intrinsic cost of the fuel itself will be negligible then. But since the fuel will have to be reprocessed many times before its ultimate consumption, as "poisons" build up and radiation damage occurs, the fuel costs will not be completely negligible, will remain perhaps a fraction of a mill per kilowatt-hour.

Power Reactors

Reactors differ not only in their basic nuclear features, as described above, but may differ significantly as to type of coolant, type of moderator, structural materials used in the reactor and thermal operating conditions. A large variety of reactor possibilities have been proposed for the development of nuclear power. Some of these arrangements have already a decade of operating experience behind them for experimental or Pu production purposes. Some have their engineering technology rather well developed, but not yet tried in a complete reactor complex.

With the experience gained from pilot plants it appears realistic to expect that 10 years from now full-scale plants could be built that should produce power for 6-7 mills/kwh, not the 10 mills we now estimate. Nuclear fuels are cheap and plentiful, and a 10-year pilot development program should bring us to the point where we can design central station size plants producing electric power economically on a national scale.

The fact that much of the technology exists, but that as yet no clearly evident best choice can be made, is pointed up by the fact that all four industrial participant groups came up with the general conclusion that nuclear power is feasible; that experience would prove it competitive. But each chose a different reactor concept as the first step toward this goal.

A Program for Nuclear Power

Our own studies at North American Aviation on reactors for the production of central station power have been governed by two principal ideas, the best way to start now, and the direction to choose which has major possibilities for improvement in the future. Our studies have shown that for power-only reactors, the thermal efficiency of the power plant associated with the reactor heat producer is of prime importance. This indicates high reactor operating temperatures and liquid metal coolants. Existing experience with thermal converter reactors and with the technology of liquid metals forms the basis for the power reactor we would recommend now, a uranium-fueled, liquid-metal-cooled, thermal converter.

This reactor produces steam at what would be called moderate modern practice, about 800 F. Through technological developments with fuel materials and coolants its operating conditions can be substantially improved and its thermal efficiency raised. While at the start it would use uranium as the fuel, this reactor system leads naturally into a thorium-fueled power breeder.

The reactor plant would cost about $50,000,000; the total power cost now from such a reactor would be of the order of 10 mills/kwh. This cost is higher than conventional power costs. The additional costs arise primarily from the high capital investment per installed capacity for such a plant, of the order of $300 per installed kilowatt.

These capital costs are high because the lack of operating experience with nuclear power plants leads to overconservatism in design all the way through. We thus face a dilemma where all realistic estimates show present costs of nuclear power to be higher than conventional costs, so that the utilities cannot economically justify making the huge investments involved in a nuclear plant; yet, we need operating experience to learn how to reduce the costs to a competitive level. One possible approach is government subsidy, in some form or other, to permit utilities to safely invest in plants of central station size, about 750 thermal megawatts.

Another is the construction, probably by the government, of pilot plants of one, or preferably several, of the more promising approaches to economic nuclear power. These plants would provide operating experience on the basis of which firm cost estimates could be made; they would permit less expensive full-scale designs than we dare proceed with now. Such pilot plants would cost of the order of $10,000,000 each, and since their primary function is the production of additional knowledge, not power for sale, it appears to be a very natural function of the government to sponsor the building of pilot plants.

A schematic model of such a pilot plant is shown here. It is a thermal converter, the reactor core containing uranium fuel rods in a lattice of moderator, cooled with liquid metal; e.g., sodium. The primary coolant system and the reactor are shielded by heavy concrete walls. The heat is transferred in the primary heat exchangers from the reactor coolant, which is very radioactive, to a secondary coolant circuit. The secondary coolant fluid, also a liquid metal but nonradioactive, is pumped through the first heat exchanger and through a boiler system where superheated steam, to drive a turbogenerator, is produced. From the boiler on, the power system is completely conventional. The nuclear reactor and its liquid metal cooling system, in effect, take the place of the fire box in a conventional plant.

With the experience gained from these pilot plants it appears realistic to expect that 10 years from now full-scale plants could be built that should produce power for 6-7 mills/kwh, not the 10 mills we now estimate. Such plants will be competitive, and can then begin to augment significantly our national power supply from nuclear fuels.

In summary, nuclear fuels are cheap and plentiful, and a 10-year pilot plant development program should bring us to the point where we can design central station size plants producing electric power economically on a national scale.

How Will an Atomic Power Plant Look?

What will be the appearance from a power engineer's viewpoint of a nuclear power plant likely to be built in the near future? R. A. Bowman, Bechtel Corp., attempted to answer this question and to give some idea of the operating procedures and requirements of such a plant in a paper presented at a recent ASME meeting in Los Angeles.

The external appearance of a nuclear power plant probably will be very much like a conventional coal or oil-fired plant except that the boiler will be replaced by a building containing the reactor and steam generator.

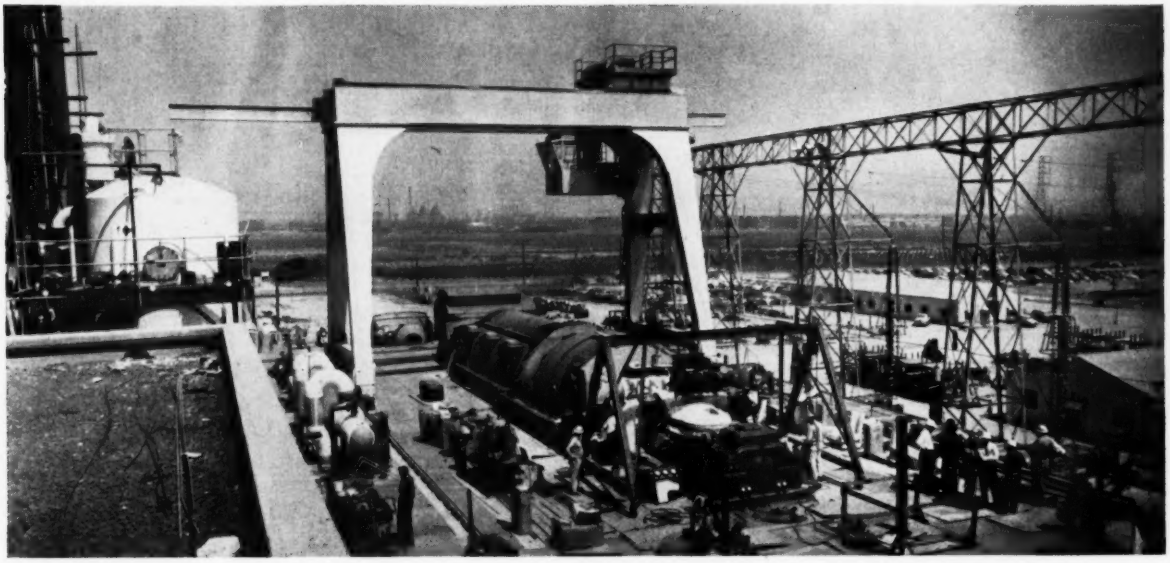
The plant is divided into steam-producing and steam-using areas as is common with fuel-fired plants. The control room is placed between these areas.

As far as plant operators are concerned, the reactor is simply a tank containing a rather large number of fuel elements and several control rods, all immersed in a bath of liquid sodium. The tank will have access openings in the top for the renewal of the fuel rods. The reactor will be complete with servomechanisms for moving the control rods in response to load requirements of the power plants.

Because of low fuel cost the first plants probably will be assigned base load and have an availability of about 80%.

The basic control system will resemble familiar combustion control systems. Imbalance will cause servomechanisms to move the control rods so that the reactor output will balance the turbine demand.

In Bowman's opinion adequate safety measures will permit operation of nuclear power plants with a lost time accident frequency ratio no higher than in a conventional steam plant.



Outdoor-type construction, lower boiler height, reduced gantry crane capacity and centralized control—all contribute to . . .

Low Cost, High Efficiency at Etiwanda

T. M. Hotchkiss

Chief Mechanical Engineer
Southern California Edison Co.

Net cost of $140 per kw is realized by many small design savings on Edison's new 250,000-kw reheat steam plant

Etiwanda steam station, Southern California Edison's latest addition to its generating resources, was designed and constructed to incorporate these basic premises:

1. The design should have the greatest simplicity, ruggedness and economy consonant with reliability and efficiency.
2. Cost should be minimized but only by judiciously combining its elements — investment, fuel, labor and maintenance in such a way that availability and reliability would not be unduly sacrificed.
3. Being favored with mild climatic conditions full advantage should be taken of "outdoor" construction.
4. Although fuel oil and natural gas would be the principal fuels, the design was to be such that coal could be utilized should future economic conditions make its use attractive. However, no avoidable investment should be made for future coal-burning facilities.
5. The station should be designed for base load operation.

By adhering to these basic premises and taking full advantage of various opportunities to effect savings in cost, the station is being constructed for a cost of about $140 per kw. This figure is based on maximum guaranteed capability of the turbine-generator units, and the cost of the station as shown does not include transmission lines, fuel oil line or waste disposal line.

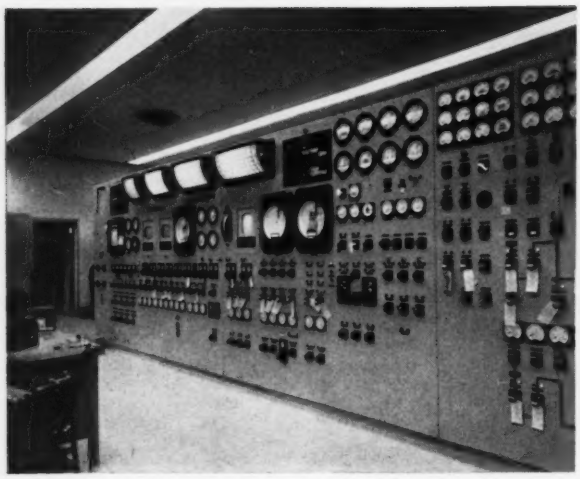
The 205-acre site, located near Fontana in San Bernardino County, was selected in preference to other locations for the following reasons:

1. It is in a rapidly growing industrial area where no fuel-burning plants now serve the Edison system.
2. The area adjacent to the site is open for industrial development with few zoning problems. Ample land is available at a reasonable cost.
3. A desirable dispersal of generating stations is obtained.
4. The site is served by excellent transportation facilities.
5. Water supply, always a problem in southern California, is met by locating the station astride the main upper feeder of the Colorado River aqueduct. The aqueduct will supply make-up water for the large cooling towers. Wells on the property will supply boiler make-up water.
6. Existing rights-of-way provide routes for additional 230-kv transmission lines.

The first of two 125,000-kw units was placed in commercial operation on July 1, 1953, and the second is expected to be in operation by Oct. 1, 1953. The addition of these units to the Edison system will increase its total steam generated capacity to 997,500 kw. Although these two units will complete present development of the site, there remains space for two additional units of equal or somewhat larger size should future load growth on the Edison system make such an addition desirable.

Choice of Unit Size and Boiler Type

Analysis of the economics of various pressures and temperatures led to the choice of 1,800 psig and 1,000 F initial with 1,000 F reheat temperatures for the throttle steam conditions. Also, the savings to be expected from use of the largest size unit consistent with system conditions made the use of 125-mw units attractive. By designing and installing two 125-mw units simultaneously, each on a unit basis, substantial reductions in the costs of



Three television systems give remote indications on main control board, left. Trays instead of conduit for the control cables, right

engineering, purchasing and construction were possible.

The choice of 125 mw for the turbine-generator unit fixed the capacity of its boiler at 920,000 lb per hour. Although natural circulation boilers were considered initially for this station, further investigation into the advantages of the forced circulation design developed important savings which led to the choice of this type for the final design. Some of the factors affecting this choice are:

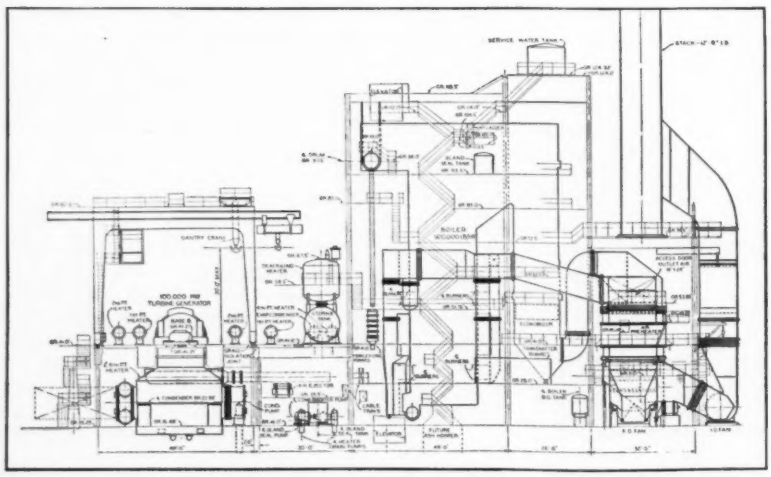
1. Forced, or controlled, circulation facilitated the use of 1,800- rather than 1,400-psig turbine throttle steam pressure. Also, with a negligible incremental cost for thicker drums, 1,950-psig superheater outlet pressure or 150 psi above that available with natural circulation was obtained. This additional pressure made possible the use of 10.5 in. OD rolled tubing for the main steam leads to the turbine rather than larger diameter forged and bored pipe costing about $150,000 more.

2. Because controlled circulation boilers use tubes of smaller diameter than natural circulation boilers, with correspondingly thinner walls for the same pressure, the skin temperature is less for equal rates of heat absorption. This should be reflected in somewhat lower maintenance costs and higher availability.

3. The controlled circulation boiler is about 13 ft lower in over-all height and about 125 tons lighter, which is advantageous when designing for earthquake conditions.

4. Controlled circulation also makes practicable the use of water-cooled spacers in the superheater and reheater, which should reduce the attack by metallic oxides in the fuel ash.

5. Because of the smaller rupture, a failed tube will be less likely to cause a forced outage than if the failure were to occur in a larger tube of a natural circulation boiler.



Elevation of Etiwanda steam station showing arrangement of the principal components

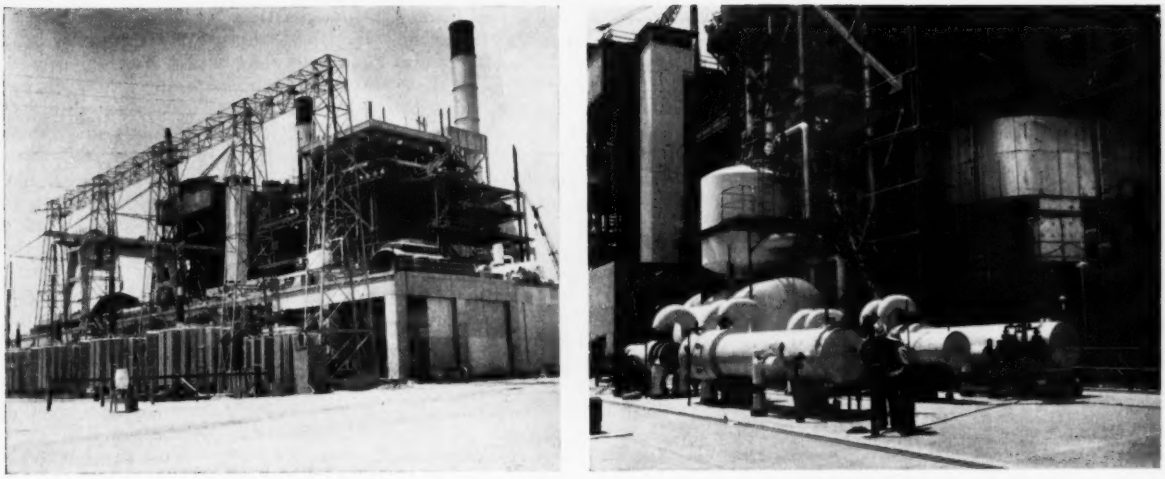
Heat Cycle

The heat cycle for a plant is adopted only after careful consideration has been given to many factors that enter into its choice, such as: hours of operation each year at various loads, optimum number of turbine exhaust flows, optimum size of condenser and cooling tower, costs of various steam pressures and temperatures not only at today's levels but also those that can reasonably be expected 10 to 20 years hence.

The cycle adopted for Etiwanda includes six stages of extraction feedwater heating plus heat recovery by the feedwater in an evaporator condenser, gland steam leakoff condenser and air ejector condenser. Because of past experience with fouling of closed low-pressure heater surfaces with a consequent increase in terminal temperature difference, it was decided to use an open deaerating heater at as low a pressure as would be economical and practicable.

In addition to maintaining a low terminal temperature difference at a point where it is of greatest value it was also desired to decrease the static head between the deaerator and its pumps to eliminate the expense of heavy supporting steel work and earthquake bracing that is required when the deaerator is placed at the usual heights of 50 to 60 ft above the pumps.

The heat cycle is expected to produce a station net heat rate of 9,650 Btu per kwh at full load on fuel oil with 2-in. Hg absolute pressure in the condenser.



Main transformer bank, turbine-generator unit and outdoor arrangement of boilers, left. Feedwater heaters and deaerators, right

Detailed cost analyses were made to determine the most economic combination of initial steam conditions, cooling tower size, condenser size and the number of turbine exhaust flows. The use of a cooling tower made it necessary to study the economics of the combination simultaneously as a change in any of these variables affected the choice of the others. The optimum combination was found to be:

1. Initial steam conditions of 1,800 psig, 1,000 F with 1,000 F reheat.
2. Triple-flow exhaust.
3. Cooling tower with 14 F approach, giving 72 F water with a 58 F wet bulb.
4. 80,000-sq-ft condenser for a yearly average vacuum of 1.65 in. Hg.

Turbine Generator Unit

The turbine is a General Electric tandem compound unit consisting of a high-pressure element, an intermediate element and a triple-flow low-pressure element.

The main generator has a rating of 125,000 kva at ½ psig hydrogen pressure, and 153,125 kva with 30 psig. Terminal voltage is 15.5 kv. It is Y-connected with the neutral connected to ground through a potential transformer for alarm only. The shaft-driven auxiliary generator is rated at 12,500 kva, 4,160 v and is air cooled. Excitation for both generators is furnished by separate motor-driven exciter units. Excitation voltage for the main generator is 375 v and the auxiliary generator 250 v controlled by direct-coupled amplidynes.

The turbine-generator unit is completely out of doors on an open concrete platform as shown. Details of the casing have been arranged to provide protection against the weather. Should it become necessary to dismantle the unit during inclement weather, a separate temporary shelter has been constructed in three sections, which may be assembled when needed during overhaul periods. It is stored at the rear of the station when not in use.

Steam Generators

The Combustion Engineering steam generators are completely out of doors. Each has a rated capacity of 920,000 lb per hour and a maximum four-hour rating of 966,000 lb per hour with superheater outlet conditions of 1,950 psig, 1,000 F and reheater outlet temperature of 1,000 F. Design pressure for the drum is 2,100 psig.

The furnace has a dividing wall in the center making two twin compartments, each of which has two tiers of oil and gas burners in every corner. In all, there are 32 gas burners and 24 oil burners. Steam temperature is controlled primarily by tilting the burners and secondarily by introducing sprayed water at appropriate control points. The load range with all burners in service is 10 to 1 for natural gas to 6 to 1 for fuel oil with the constant differential pump in service and 2 to 1 without the CD pump. At maximum capability the station will consume about 8,100 bbl of fuel oil per day or 54 million cu ft of gas per day.

Three pumps for circulating the boiler water are provided, two of which are required for full load and the other is a stand-by available for immediate starting.

Two forced- and two induced-draft fans together with two regenerative air heaters are provided for each boiler. Steam coil air heaters placed between the forced-draft fans and the air heater inlets and supplied with steam from the third extraction point in the turbine extraction cycle maintain a minimum average metal temperature of 215 F, thereby making it possible to reduce the final flue gas temperature to about 280 F with a corresponding increase in boiler efficiency.

An automatic sequential soot blowing system is provided with all necessary elements for oil and gas firing. The blowing medium is compressed air.

A steel stack with a reinforced gunite lining conducts the flue gas to an elevation 175 ft above grade before discharging it to the atmosphere.

Centralized Control

The Etiwanda station is the first steam station on the Edison system in which controls have been centralized in one main control room. To further the objective of reducing costs to the lowest practicable point, compactness in arrangement of control room equipment becomes necessary. At the same time the control room arrangement should primarily make it as easy as possible for the control room operators to:

1. Protect and control equipment.
2. Maintain load during system disturbances especially station auxiliary power supply.
3. Restore load if lost.
4. Maintain communication with station and system operators.

With these objectives in mind, instruments and controls for the protection of load and equipment are arranged on the front of the board so as to facilitate the correlation of information enabling prompt decision and action. Because many station economy functions may be made automatic these together with safety checks

requiring only occasional attention are placed on the back of the board.

The control room at Etiwanda is based on the use of two control room operators per shift, one to handle electrical controls for the 230-kv and 69-kv switchyards and one boiler and one 125-mw turbine. The other operator will operate controls for the second turbine-generator unit. To reduce travel and enhance over-all visibility of controls, the boards for the turbine and boiler controls were kept within a length of 17 ft. The board for unit No. 1 was placed opposite to unit No. 2 board with controls in mirror arrangement. These boards are arranged lengthwise in the room.

For compactness and proper correlation of information the instruments and controls are grouped functionally. Each group controls a particular function such as fuel supply, feed water supply, or auxiliary power supply. In addition to instruments and controls for the above functions certain recorders are also placed on the front of the board.

All control switches for starting and stopping the prinicipal auxiliaries together with annunciators are placed on the front of the main control boards.

On the front board are three television screens. One of these shows the water level in the boiler gage glass and the others display images of the various burners in the furnace. Cameras for scanning the furnace are located high up in the front furnace wall and produce an image of the burner flames which guide the operator in "lighting off" and otherwise checking upon the condition of the fires.

At one end of the room the 230-kv and 69-kv controls are grouped on a single board. At the opposite end of the room is a small board on which are arranged:

1. Controls for automatic sequential soot blowing systems.
2. Evaporator controls.
3. Water level indicators.
4. Circulating water and air pressure gages.
5. Auxiliary pump controls.

Communication facilities also are centered in the main control room. These include the station PAX system, the public address system and the Edison and Bell system long distance lines.

Fuel Supply System

To insure an adequate supply of fuel for the station three means of transporting fuel oil were studied including pipe line, truck and rail. Because of the large savings available over alternate means, an 8⅝-in. OD pipe line for transporting fuel oil has been constructed from the Santa Fe Springs oil field to Etiwanda, a distance of 41 miles, together with three intermediate heater-pumping stations. At each station oil is heated to about 200 F by means of direct-fired tubular heaters and is pumped by electrically driven reciprocating pumps at a pressure of about 800 psig.

During certain times of the year natural gas is available on an interruptible basis. To bring gas to Etiwanda a nine-mile line was constructed to connect with the Texas gas line near Pedley.

At the station site fuel oil is stored in four tanks 140 ft in diameter by 48 ft high each with a capacity of 131,500 bbl. When full the four tanks contain enough oil for two months' operation. Each tank is equipped with an internal suction steam heater for heating the oil to a temperature suitable for pumping.

Primary oil pumps with appurtenant equipment are located on a concrete platform completely out of doors. From the storage tanks the oil flows by gravity through strainers to the suctions of the primary oil pumps. Six pumps are installed, three for each steam generator. Two pumps are adequate for full load on one boiler with the third pump as stand-by. Each pump will deliver 80 gpm against a head of 760 psig. The pumps are of the rotary screw type with constant displacement.

From the discharge of these pumps oil is transported to a location at the rear of the steam generators and enters the secondary heaters where it is heated by steam to reduce the viscosity to about 180 SSU for proper atomization at the burners.

To provide flexibility and to increase the automatically controllable load range another pump known as the "constant differential" pump is used. Further flexibility is provided by varying the number of burners in service.

Because gas fuel, when used, is subject to interruption on short notice, means have been provided for rapidly changing over from one fuel to another by remote control from the main control room.

Cooling Towers

Four cooling towers have been installed for the two main generating units. Every tower has eight cells each provided with a motor driven induced draft fan operating at a single speed. Any cell may be taken out of service for the inspection or repair by shutting down the fan and stopping its water flow.

Rather than the conventional basin, the foundation for each tower is a concrete slab which slopes gently to an open gunited flume. As the district where the plant is located is subject to winds of varying intensity, dust, leaves, tree bark and other debris might collect in a tower basin if one were used, whereas with the slab these can easily be hosed into the open flume and removed by screens at the central settling chamber in the flume system. This construction importantly reduced the cost of the tower foundation.

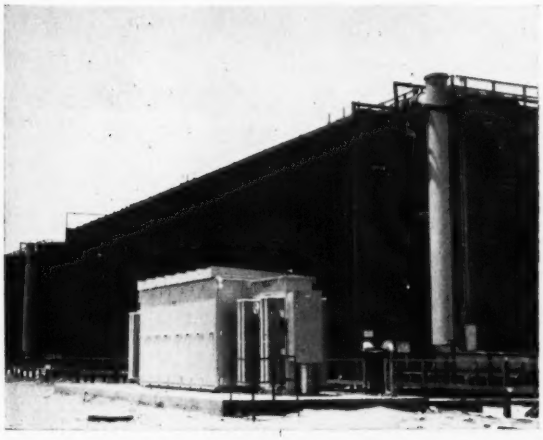
Special attention was given to providing means for handling fan parts during maintenance and overhaul to minimize the size of maintenance crews. A one-ton gantry crane built to travel along the tower top will lift and transport motors, gear boxes or fan blades to one end of each tower section where they may be lowered to the ground through a trap door.

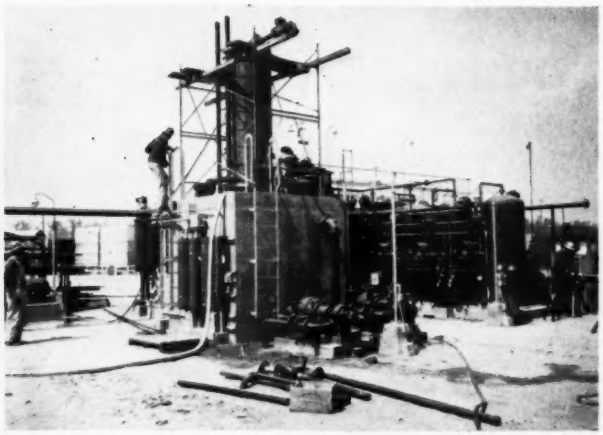
Water Treatment

Water for the main condensers is withdrawn from the Metropolitan Aqueduct (raw Colorado River water) and pumped to a 40-acre-ft storage reservoir. Because this water is used in a cooling tower system special treatment is required to prevent deposits forming on condenser tubes, heat exchangers and piping and at the same time keep corrosion on these surfaces at a minimum. Since raw Colorado River water contains about 650 ppm total dissolved solids including about 310 ppm total hardness and 120 ppm total alkalinity with a pH of 8.4 and is concentrated about four times in the cooling tower cycle, treatment with sulfuric acid to lower the pH is necessary. This will be accomplished by the direct introduction of sulfuric acid into the system under manual control as determined periodically by pH and conductivity measurements. Also, should future conditions require its use, equipment for the introduction of phosphate or other inhibitor can be installed.

Because the cooling tower blowdown water will have a concentration of almost 3,000 ppm it cannot be discharged into storm drains and thence percolate into the ground water basin. It has been necessary to build a 15-mile concrete pipe line of 5 cfs capacity to connect with an established waste disposal system in Los Angeles County which will conduct the waste blowdown to the sea.

Other waste waters from the plant will be collected in a compartmented 4-acre-ft retention basin for proper treatment before being discharged into the waste water line.





Cooling towers with metal-clad sub, left. Acid feeding equipment for condenser water and zeolite softeners for boiler water, right

Water for boiler feed will be supplied by wells on the station property and stored in a 5,000-bbl tank. Initial treatment consists of passing the water through a zeolite softening plant followed by supplementary acid feed and degassing before being fed to evaporators. Evaporators and an evaporator condenser operating as part of the turbine heat cycle produce distilled water of high purity which is introduced into the feedwater system. A supplementary chemical feeding plant supplies phosphate, sulfite and caustic solutions to the main condensate system or directly to the boilers.

Electrical Features

The main and auxiliary generators have been mentioned above. Main 15.5/230-kv transformer selection was based upon economic studies covering the use of three-phase versus single-phase types and basic insulation levels. Because of railroad clearances as well as first cost, three-phase transformers proved uneconomical for the ratings desired. Prior to the selection of the Etiwanda transformers it had been the company policy to specify 1,050 kv as a basic insulation level for its major 230-kv transformers without lightning arresters. However, studies showed that by reducing the basic insulation level to 825 kv and by installing lightning arresters, a saving of about $170,000 could be made. Accordingly, seven single-phase 15.5/230-kv, 45,000-kva units were purchased with provision for the future addition of fans for forced-air cooling which will increase the rating to 60,000 kva.

The 230-kv side of each generator step-up transformer bank is connected through either side of two selector oil circuit breakers to a 230-kv double bus. A tie breaker is provided between the two 230-kv buses. Two 230-kv transmission lines are installed initially with provision for two future lines. Also space has been provided for extending the 230-kv switchyard to accommodate two future generating units. All 230-kv breakers have an interrupting rating of 3,500,000 kva.

Study was also given to the use of isolated-phase generator lead construction. This however proved to be uneconomical for all except the runs below the turbine deck. Elsewhere the runs are of aluminum channel on post-type insulators protected by gratings above and screens below. The expected saving is about $70,000.

As much wiring as practicable has been placed in cable trays and conduit has been kept at a minimum. It is expected that a 20% saving has been made as compared with all-conduit construction.

To reduce copper requirements, 4,160 v was selected for all large motors and 480 v for the smaller motors.

Auxiliary equipment has been sized to fulfill two conditions of operation:

1. When operating at the maximum guaranteed steam flow of 920,000 lb per hour to the turbine throttle, auxiliaries are sized to have 15% margin in capacity when operating with a 60-cycle power supply.

2. With the turbine delivering 125,000 kw the auxiliaries have sufficient capacity to perform at 7½% underspeed corresponding to a frequency of 55½ cycles.

The exception to this provision is the circulating water pump. Because any marginal capacity added to these pumps would result in excessive condenser tube water velocity when operating under normal conditions, it was considered advisable to size these pumps to meet normal operating conditions and accept a small reduction in generating capacity in the event frequency drops to 55½ cycles.

For cold start-up and stand-by station service power, a 12,000-kva 69/4.16-kv three-phase delta zigzag transformer with the low-voltage winding connected to ground through a potential transformer is installed. A loop connection from a nearby 69-kv line is brought into the station as a power supply source to the stand-by station service transformer.

Miscellaneous Features

A few additional means to reduce costs in the construction of the station remain to be mentioned.

1. Elimination of as many buildings as practicable has resulted in constructing only a control room, a separate one-story administration building, shop, warehouse and chemical treatment building at the site.

2. Efforts have been made throughout to achieve all architectural effects and functional finish through the use of good well-placed concrete without plaster coats or paint and with a minimum of tile. "Tilt-up" concrete construction is being used for the administration building.

3. A substantial saving was made by a reduction in the size of the main turbine crane. Such cranes are usually a heavy expense, particularly when the support systems with their heavy columns and crane girders are taken into account. Eliminating the building permits use of a gantry crane, but to provide a crane of any type to handle the heaviest load is expensive. At Etiwanda, the heaviest pieces weigh about 200 tons, while the second heaviest weigh only about 60 tons. However, the heaviest loads, being the generator stators, need only be handled once, and the carrying charges on a 200-ton crane and its supports would be about $37,500 per year against those of a 60-ton crane of

about $13,400. By cribbing, jacking, and rolling the stators into place, the difference in annual carrying charges can be saved almost every operating year.

4. By elimination of boiler and turbine buildings, the troublesome and often costly ventilation problem is also eliminated. It is estimated that this saving will aggregate about $75,000. Also, the problem of cleaning is simplified by designing to permit hosing down boiler casing, piping, decks, walkways and all exposed equipment.

5. Minimum subsurface construction has been accomplished because of very favorable ground conditions. Both in natural ground at the site and by use of controlled compaction in fills, forms were not necessary for most footings and subgrade concrete.

6. Minimum use has been made of steam auxiliaries with consequent savings in piping, valves and insulation costs together with their maintenance. Etiwanda will use steam only for fuel oil heating and for normal air removal jets on the condensers. A large reciprocating dry vacuum pump will be used as a "hogging" jet for rapid evacuation of condenser steam space and as a backup for the steam air ejectors.

7. Important savings resulted because the valve between the boiler outlet and turbine stop valve was eliminated. Also the use of flexible steam leads instead of rigid leads and a flexible superheater outlet effected a saving of about $25,000 per boiler. The use of rolled instead of forged and bored tubing for the main steam leads also led to an appreciable cost saving.

Staff

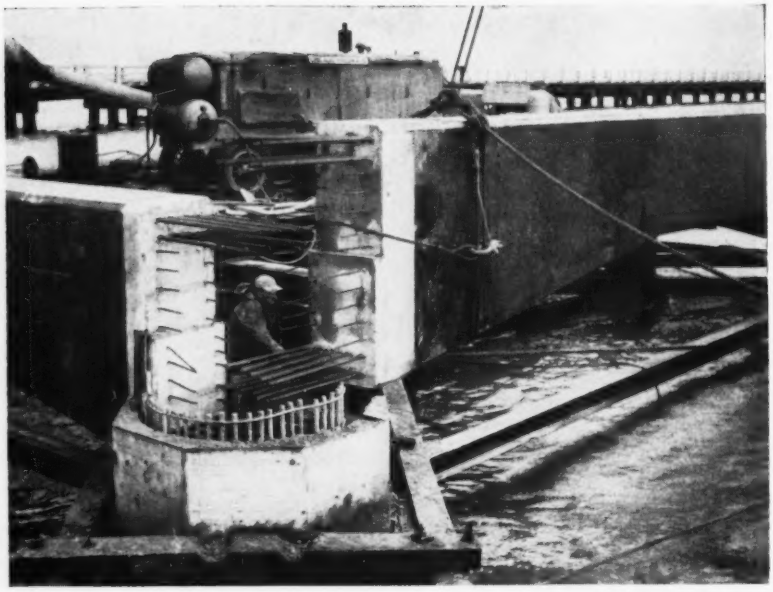
According to present plans the following staff will operate the Etiwanda station:

Operation (per shift): Watch engineer, 1; control room operator, 1; assistant control room operator, 1; power equipment operator, 2; guard, 1; total, 6.

Supervisory (day shift only): Station chief, 1; assistant station chief, 1; efficiency engineer, 1; technical assistant, 2; clerk, 1; typist, 1; total, 7.

Maintenance (day shift only): Foreman, 1; machinist, 2; instrument man, 2; electrician, 2; boiler and condenser mechanic, 1; maintenance helper, 3; electrical helper, 2; utility man, 1; janitor, 2; total, 16.

The Etiwanda steam station was designed and constructed by the Stone and Webster Engineering Corp. in close collaboration with the engineering and operating departments of the Southern California Edison Co.



Setting 50-ton precast concrete beam on 62-ft column on deep-water-tower foundation

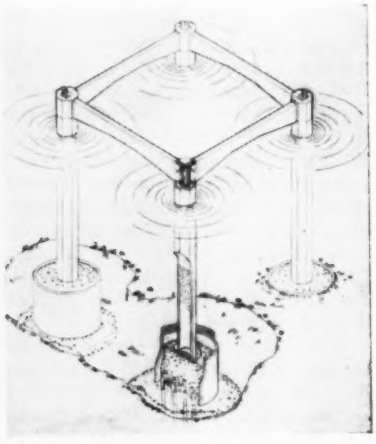
Concrete Caissons and

Long spans over the open water of lower San Francisco Bay, with precast concrete caisson and pile foundations, feature a recently completed seven-mile section of a twin-circuit, 220-kv tower line built by Pacific Gas and Electric Co. This crossing is part of a 33-mile line between Moraga substation on the east side of the bay and San Mateo substation on the San Francisco peninsula.

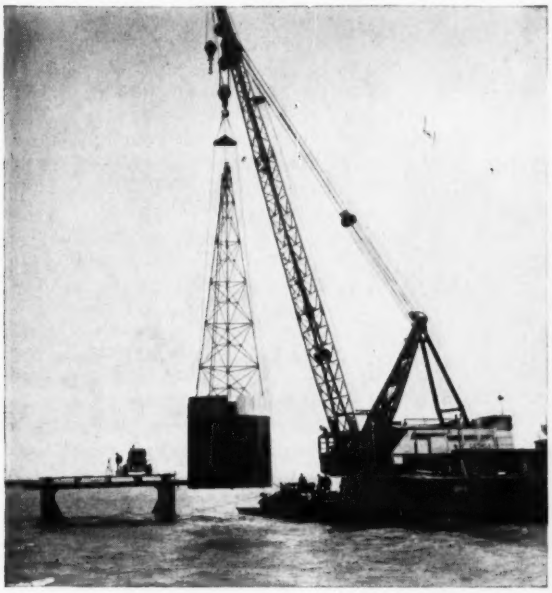
The seven miles of open salt water and deep mud on the bottom of the bay presented an unusual problem for the construction of a major 220-kv line. Because of the battered configuration of the tower, foundation costs are independent of height of tower to a great extent. For this reason the greatest economy was obtained by the use of long spans. Optimum length of span was found to be approximately 2,000 ft.

Twenty-one double-circuit steel towers located closely parallel to the Hayward-San Mateo bridge comprise the seven-mile crossing. Of the 21 towers, 19 are in shallow water and

Tower erection on steel-reinforced piers



Schematic arrangement of deep-water piers



Lowering precast concrete caisson to form pile cap for deep-water tower, left. Right: Setting the anchor bolts for shallow-water tower

Long Spans

E. G. Lambert
G. L. Coltrin
Pacific Gas and Electric Co.
San Francisco

two in deep water. Shallow water towers are made up of 16 suspension towers, one of which is 160 ft high and the remainder 200 ft high. There are three dead-end towers, one 148 ft high and two 184 ft high.

Footing Design

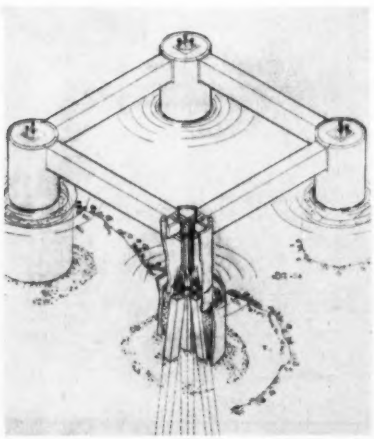
Designing a tower footing suitable for the thick mud of the bottom of San Francisco Bay presented a real problem to PG and E structural design engineers. They developed a logical and most interesting type of footing as shown by the accompanying photographs.

Each footing for the suspension towers consists of a precast reinforced concrete caisson or shell, 10 ft high and 12 ft in diameter, which is placed over five precast reinforced battered concrete piles. These shells rest on a layer of sand and gravel and are first partially filled with tremie concrete. Into the top of this shell and resting on the tremie concrete is placed another shell, 20 ft high and 8 ft in diameter. Tower anchor bolts are placed in the top of this shell, after which it is filled with concrete. A precast concrete beam is used to tie the tops of the footings together.

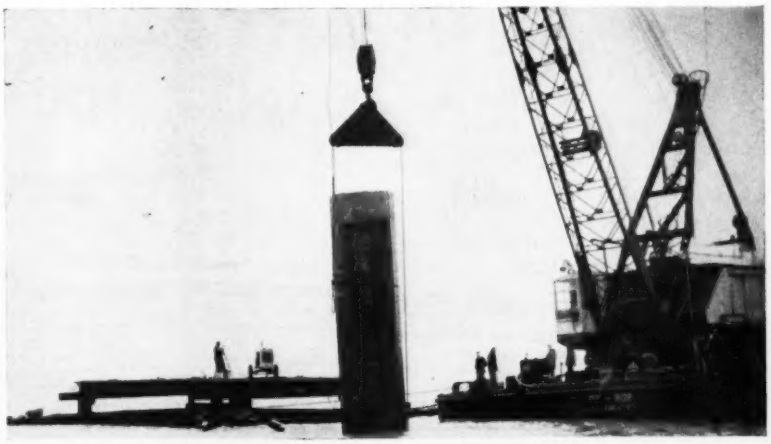
Foundations for the dead-end towers are essentially the same as for the suspension towers except that eight precast concrete piles are used under each footing.

The deep water towers are 298 ft high and 1,975 ft apart. Each footing or pile cap in the foundations for these towers consists of a precast reinforced concrete shell, approximately 16 ft high and 19 ft in diameter, which is placed over 23 vertical wood piles. These shells also rest on a layer of sand and gravel.

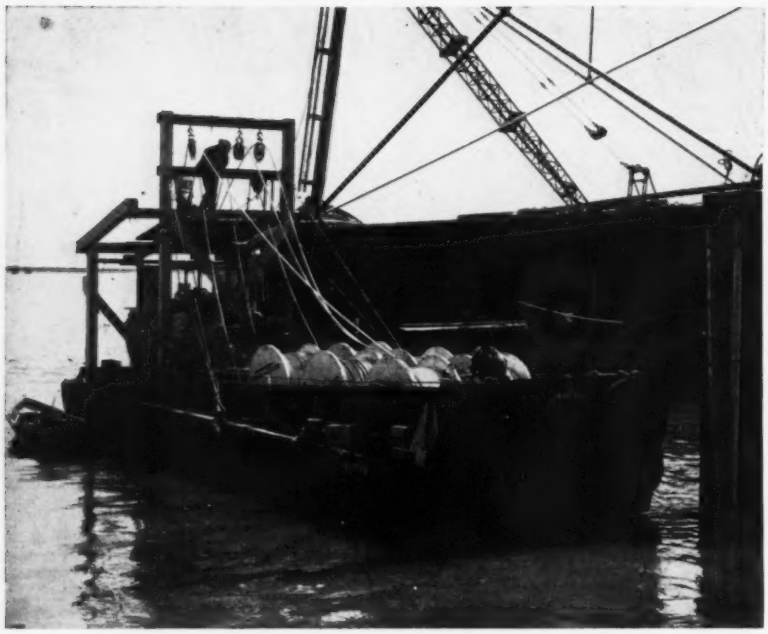
Since tops of these shells are several



Construction used for shallow-water piers



Lowering 62-ft precast caisson in place to form main column for deep-water foundation



A converted flat-bottom LCM was made to order for working in shallow or deep water

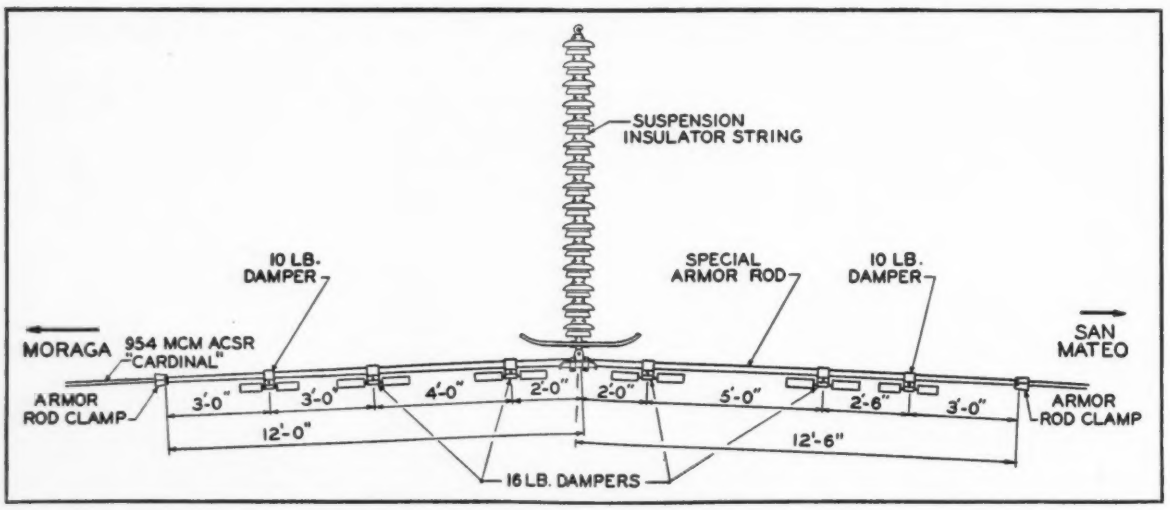
feet under water, each shell as it was placed in position had a temporary steel frame attached to the top. This frame, extending above water, was used to sight on in leveling and centering the shell. The shell was then partially filled with tremie concrete. A 62-ft precast concrete column, 7 ft in diameter, was then placed in the top of this shell. Tower anchor bolts were placed in position and the column filled with concrete. A precast concrete beam was used to tie the tops of the footings together.

The conductor, 954,000 cir mil ACSR, is strung across the bay so that the maximum tension, occurring at 25 F and a 14-lb wind, is 8,360 lb. Wire clearance above mean higher high water at maximum sag conditions (130 F) on the bay crossing, other than the main channel, is 40 ft. Minimum clearance over the main channel is 160 ft, which gives a clearance 25 ft higher than that of the raised lift span of the adjacent Hayward-San Mateo bridge. The remainder of the line is designed for a maximum tension of 7,500 lb at 25 F and an 8-lb wind.

Insulation on the bay crossing consists of 15 fog-type units on suspension towers and 21 high-strength units on dead-end towers. The rest of the line has 13 and 14 fog units in suspension and 20 high-strength units in dead-end. The 14 units are used on towers immediately adjacent to the bay crossing. By using 15 fog-type units on the bay crossing section of the line it is expected that periodic cleaning of the insulators will not be required.

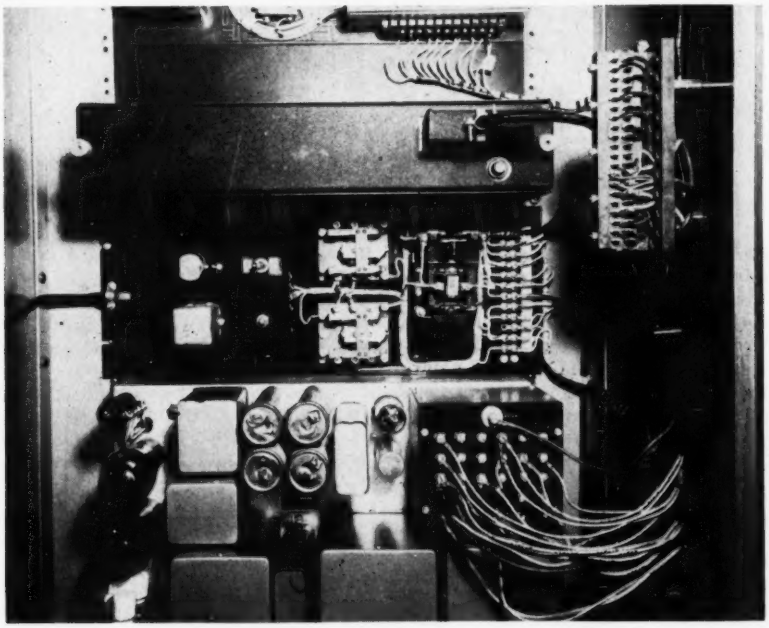
Stringing of the conductor across the water was materially aided by the use of a converted LCM whose flat-bottom construction enabled it to cover both shallow and deep water. The converted landing craft was equipped with six standard reels of cable, three of which were used at one time in laying cable in the water. After the cable was laid out, it was raised to the proper positions on the towers and placed in sheaves, after which it was pulled to proper tension. The entire seven-mile crossing was pulled up from the west shore side.

Because of high winds experienced in the lower end of San Francisco Bay, special precautions have been taken to prevent damage because of conductor vibration. At all suspension points on the water crossing towers, special 25-ft-long armor rods are installed. Placed over these armor rods are three stockbridge dampers, two 16 lb and one 10 lb on each side of the suspension clamp. At each dead-end two 16-lb and one 10-lb dampers are used with no armor rods. The remainder of the line uses standard 115-in. armor rods on all suspension towers with one or two standard 16-lb dampers placed beyond the ends of the armor rods.



Special armor rodding and damper installation used on suspension towers of crossing for protection against damage from vibration

Whether or not anyone is on duty at Kingman, Ariz., Municipal Airport a radio beam...



from the plane operates this electronic equipment in the control tower. That's how...

Airplane Pilots Turn on Lights

Three pulses from the radio in an airliner as the plane approaches Kingman Municipal Airport at Kingman, Ariz., turn on the field and associated lighting system. This automatic method saves manpower and insures Bonanza Air Lines, using the airport, light for landing its planes no matter what time of night they may arrive.

The system is operated on a carrier-controlled relay unit and associated equipment operating in conjunction with the squelch circuit of the VHF receiver on the Bonanza Air Lines assigned frequency. The receiver squelch circuit control is adjustable to operate the carrier-control relay and associated equipment when the receiver is excited with a predetermined number of carrier pulses from the aircraft transmitter, within a radius of approximately one to one hundred miles of that receiving point.

The action of the controlled relay is transferred to a selector or stroger unit, whose internal functions follow and step in accordance with the carrier-relay pulse action. The step action of the selection unit, together with its internal holding and other associated relay, controls a bank of external relays whose function, in turn, controls the master field light-control circuits.

Incorporated in this circuit is a self-locking electrical feature that protects the master control relay from accidentally becoming de-energized because of the electrical and mechanical action of the stroger unit immediately after the energizing cycle. Further, simultaneous action triggers and trips the stroger unit, completing the cycle. Three pulses are used to turn on the lights and five pulses to turn off. This is accomplished by pressing or keying the mike button control of the aircraft VHF transmitter. Spacing is approximately one-half second apart. Electronic control is the master, overriding manual controls points on the ground.

The original receiver did not have this relay incorporated and it was fabricated in the shop of Bonanza Air Lines under direction of R. Mohr, superintendent of communications. Success of this device has caused demand for more production of it and Wilcox Electric Corp. of Kansas City now manufactures it.

The stroger unit, which is the heart of the system, is controlled by the pulse action of the carrier-control relay. It, and associated circuit, is so arranged as to transfer when excited by the carrier-control relay pulses, whose action is then transferred to the master-control relays.

Heavy static, lightning discharges or other phenomenal disturbances that might cause momentary pulsing are suppressed by the squelch action of the receiver. Further precautionary action lies in the operating sequence and in the locking features of the circuit. For example, say the lights have been turned on, to turn them off requires precisely five pulses from the aircraft transmitter—not four, or six, or any other combination.

The equipment, however, may be adjusted to operate on many other combinations to suit the particular requirements. For example, says Mohr, a private operator could adjust the sequence so that only he, who knew the combination, could control it. For the cross-country or visiting pilot, the sequence is standard. Until manually changed, the equipment will remain in the operating sequence that has been selected.

Testing procedure is accomplished by keying to the ground station transmitter in the sequence prescribed.

SIX PARKING AREAS lighted to 2 f-c from 47 1,000-w floods both advertise, make shopping easy at new San Francisco store, as . . .

Power and Light Aid Sears to Sell

Nothing looks as dead and deserted as an ancient cemetery. And nothing is quite as lively as a Sears, Roebuck & Co. store on a shopping night.

This contrasting swing was recently accomplished at the intersection of Geary Boulevard and Masonic Street in San Francisco when a huge new residential shopping area store was opened by Sears, Roebuck on ground that for half a century earlier had been a cemetery. Now, brightly lighted at night to both advertise the location and store and make parking easy, its six large parking areas on three levels and the roof teem with activity.

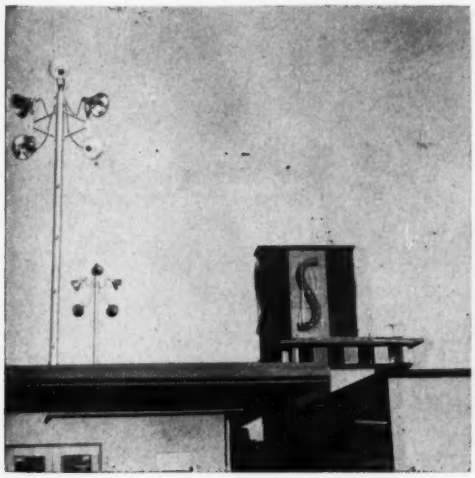
Electricity for high-level illumination, both outside and in, and for air conditioning and elevators plays a big part in the merchandising program of this large store. How best to serve such a large area with such a high density of electric load was solved by Architect W. D. Peugh and his electrical engineer, Arthur Spence, by use of a 480-v distribution system to three unit substations at centers of load. This voltage was also used to advantage to serve the parking areas for lighting.

Power Supply

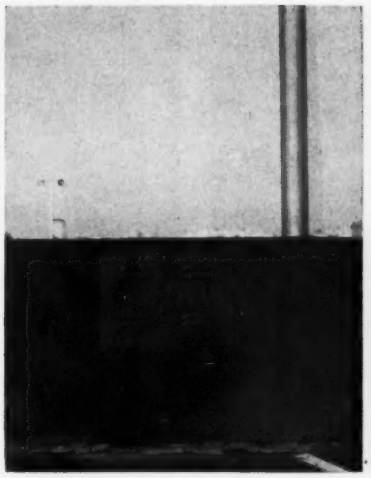
Main power supply comes in at 12,000 v from Pacific Gas and Electric Co. to a substation owned by the Sears store and installed by the contractor. It is metered at the primary and then stepped down to 480 v and fed through a duct into the main switchboard room. Here a main switchboard of four sections contains one 3,000-amp main circuit breaker at 480 v, an instrument panel, a panel containing three circuit breakers, one for each of three substations. The substation breakers are 800-amp, 480-v breakers. Another power panel completes the board. On it are four breakers to serve the refrigeration compressor, the elevators and escalators, the air conditioning and the boiler room power. Each of the three substations is fed the 480 v to a bank of 500-kva transformers that drop the voltage to 120/208 delta to star to feed the lighting circuits.

Since the building is 417 ft long and on three levels, plus a penthouse, such distribution divides the lighting load and provides the substation near

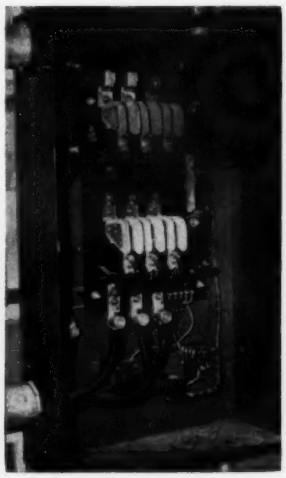
STORE INTERIOR lighting includes troffers, valances, down-spots, case, niche lighting



MOUNTING height averages 31 ft for the 17 floodlight poles on roof or parapet walls. Note sign on tower and TV antenna



TRANSFORMERS mounted at base of floodlight poles, with multibreaker on secondary, are either 2, 3 or 5 kw as required



EMERGENCY transfer switch in switchboard room turns on gas engine generator for safety exodus lighting if power fails

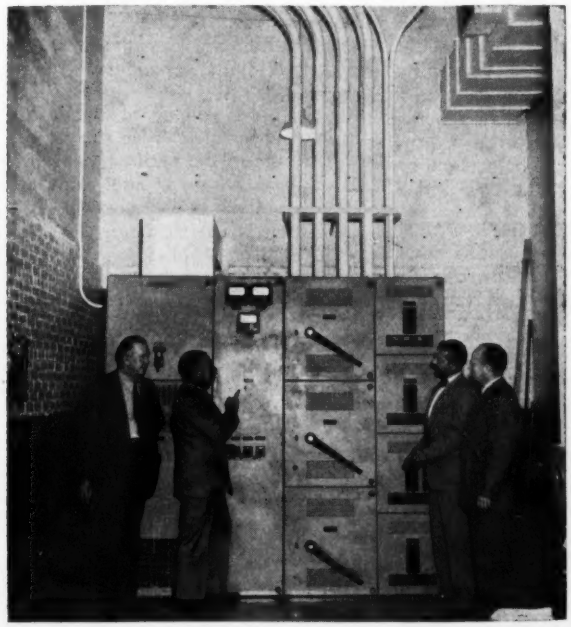
a center of distribution. Feeders go up from these substations to the four floors and terminate in groups of lighting panels located in stockrooms adjacent to the main display floor. The substations make use of Inertol-filled transformers.

In wiring the building Weber Electric made all conduit bends in the field with large radius to insure convenience in pulling of the conductors. The minimum size circuit conductor from the panel boards to the first outlet was No. 8 wire and thence to remaining outlets No. 10. This insures minimum voltage drop on long runs. All conduit leading from panel boards are a minimum of one inch to insure future capacity for increased usage. Expansion joints were installed at the slabs to take care of expansion and contraction in such long conduit runs.

All wire not in contact with the earth is RH wire and all wire in the slab and in contact with the earth in the store area is Okolite-Okoprene.

Floor boxes were installed at display table and island locations and there is some underfloor duct in the cashiers' cages. Every column has at least two outlets.

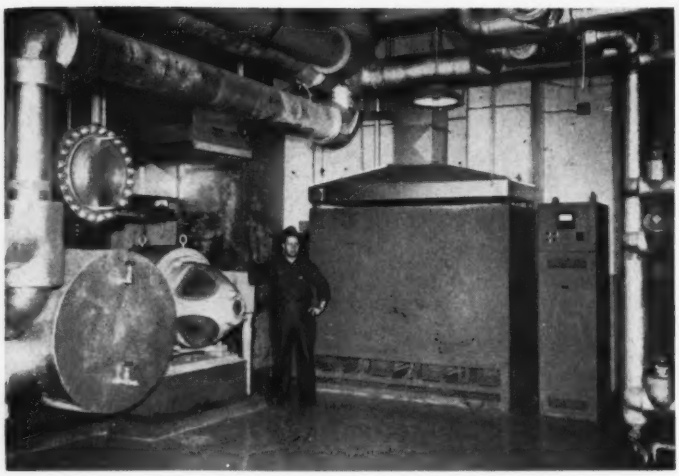
All the office sections have Walker underfloor duct for both telephone



SMALL MAIN BOARD made possible by 480-v system is fed from transformer vault at its rear. It contains 3,000-amp main breaker at left, instrument panel, breakers to each of three substations and four power feeder breakers. Emergency set panel at lower right corner is part of 35-kw gas engine driven generator

THREE SUBSTATIONS like this are located at centers of distribution in the large building to step down 480 to 120/208 for the lighting. James Delos, estimator-engineer for Weber Electric; Harry Johnson, Westinghouse Electric Corp.; Emil J. Weber, contractor; Spense Pors, Westinghouse Electric Supply, were on job

AIR CONDITIONING system 300-hp compressor motor and grids for the motor control housed in a ventilated cabinet along wall



CONTROL BOARD for air conditioning system opened by Bob Nordin, maintenance. ADT smoke detection panel at upper right

and convenience outlets. All telephone lines are in conduit, terminated in various panels throughout the area. In the lamp display area Plugmold is used around the counters to feed the display of numerous lamps.

Two two-inch conduits were run from the roof to each floor for television and radio antennas.

All the motor-control panels have a wiring terminal strip and are provided with a raceway along the bottom where the circuit wires terminate. The motor load includes a 300-hp motor on the air conditioning system in addition to the various fan and blower motors, pumps, etc., necessary to the system. The air conditioning system is arranged to control the humidity, to provide refrigeration or heating. There are two freight elevators operating at 480 v and the moving stairways on 208 v.

The lighting of this store is spectacular and has a number of interesting new features. General lighting comes from parallel rows of four-lamp 40-w lamp Globe fixtures set flush in the ceiling. These are arranged alternately in single and double units. The columns are on 26-ft centers, 25 ft apart and two rows of units run between the columns. There is another single row of units that runs along each side.

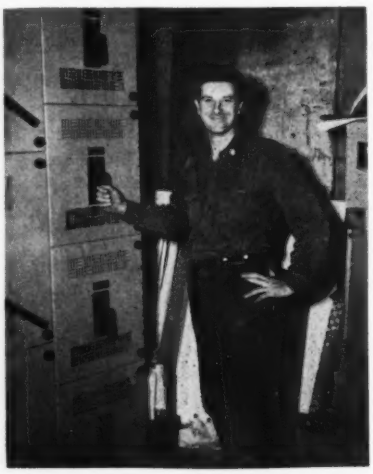
In addition to this, a strip of fluorescent lighting is concealed behind a valance 18 in. from the wall and serves both to light the upper wall with the murals and the showcases below. There are numerous built-in light boxes for display of merchandise, equipped with four 18-in. fluorescent lamps for accent lighting.

In addition to this, at island locations bullet-shaped reflector hoods are suspended from long aluminum hangers to house PAR floods or spots directed on the displays of merchandise below.

The lighting fixture display has 50 outlets on the walls and lowered ceiling and 96 outlets on a higher ceiling. Two panels are required to serve this concentrated area.

Display windows are all on time clocks as are the floodlights and signs.

Emergency lighting is supplied through an Onan auxiliary set. The gas engine runs on natural gas and turns a 35-kw motor generator. The set supplies enough electricity for the exits, stairs and a few guiding lights on all four floors. An automatic transfer switch starts the auxiliary generator set on power failure or on a drop of voltage below 85%. The emergency panel also can be remotely operated from a button at the second floor entrance.



Frank Voitlander, superintendent for Weber Electric, was on this big job for 16 months

The floodlighting system for the extensive parking area is unique. There are six large parking areas with ramps connecting them and a separate ramp to the roof, which is also used for parking. Altogether there are 47 1,000-w floodlights to light these areas to a 2 f-c intensity. Because of the distance covered 480-v feeders are run to a cabinet set in the concrete wall at the base of each of the standards and in this cabinet is either a 2-, 3- or a 5-kva transformer depending on the number of units per pole to reduce the 480 to 120 v single phase. This provides good voltage at the lamps, and also reduces the wire size needed to distribute to the lighting standards. All of these are on a time clock and contactor in the boiler room.

Other electrical features in the building include an ADT smoke-detection and protective system on the vaults and air conditioning system, a sound system throughout the building with speakers located in the ceilings. There are six channels on this system and it is controlled by sections or can be controlled from the outside or the manager's office. The main system is adjacent to the telephone operator's room. Ordinarily music is played over the system but it can be used for announcing.

Architect for the building was W. D. Peugh of San Francisco and electrical engineer in his office Arthur Spence. Emil Weber, Weber Electric Co., was the electrical contractor and James Dellos his engineer. Frank Voitlander was foreman. Bob Nordin has taken over as maintenance engineer on the building.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Fairly good

Busy and quiet—that expresses the construction situation at press time. Building maintained an unexpected stride and seems to be continuing so into the fall. Some contractors are complaining over lack of new work in some areas of the West but on the whole most are busy. But competition is getting more intense and costs are rising. High wages the electricians got has caused trouble in the other trades and there have been strikes of plumbers, laborers and others trying to get the newest round of raises and welfare. In some places this has tied up construction and increased contractors' costs.

Expensive plum

Ford plant job to be built at Milpitas, between Oakland and San Jose, was the talk of the area all last month. A job this size attracted 26 bidders, some 15 or so finally filing. Probably the biggest estimating school session and most expensive in some time. Typical bidders had as many as five estimators working 16 hours a day for two weeks on it. Multiply that by 15 bidders and it's a lot of wasted effort when only one firm can get the job. Pomeroy Co., evidently the general contractor low bidder, still hadn't admitted who was going to get the electrical, which will run around $2,000,000.

Mice will play

While all the Oakland big contractors were so busy figuring the Ford job one contractor from Richmond said he came in to Oakland and got four good jobs with almost no competition.

Can't win

Just as copper prices were coming down came word that the IUMSW has voted 9 to 1 to strike all principal copper producers. Give aluminum another boost, no doubt, if copper prices still climb.

Precaution on TV

Boise just passed an ordinance that all TV antenna over 15 ft high must be inspected for construction and a building department permit is required. Only those over 15 ft are included. Protective grounding is included.

How they say it

A different ruling was received from Internal Revenue as to including pay for travel expense and subsistence in paying to the Federal Insurance Contributions Act fund by the Northern California Chapter of National Electrical Contractors Assn. from that received by the Sacramento Valley Chapter, NECA, and the San Francisco Chapter. This was probably because the clauses in the contracts of Northern California Chapter with IBEW locals 595 and 302 were much more specific in separating travel expenses and subsistence from wages.

Hot over heating

Tacoma City Light thought it was doing its public a favor when it loosened up on its electric heating installation ban made necessary by the power shortages. It announced it would take on electric heating load if the customer assured that his house was well insulated to eliminate heat loss and knew what the rate was and that it could go higher if so much of such load caused the utility added expense to serve it. Contractors welcomed the news, but fuel dealers didn't. They ran big ads denouncing the city utility, recalling the power shortages, warning of the 65% clause in the rate and claiming that oil was cheaper.

Advertise heat

Electric heating is to be promoted also in the Spokane area by the Supply and Apparatus Section of Inland Empire Electrical League, beginning in August with a series of ads. Henry Vincent of WESCo, chairman of the section, said the subscriptions to finance the promotion from these interested in the business were practically to the goal of $2,000 set.

Will try selling

AW on TV in the San Francisco Bay region is practically assured too. Initiated by the San Francisco Electrical Contractors Assn. and IBEW Local 6 the program will be handled by the Northern California Electrical Bureau and receive support through the bureau from wiring materials suppliers and manufacturers, other contractor and union groups. The plan is to put on a series of TV spots following a major TV program to plant short concise ideas in viewers' minds that will cause them to ask for adequate wiring in new houses, stimulate rewiring old homes.

Overlooked in rush?

Federal construction contract bill. HR 1825 and S 848, sponsored by NECA and the mechanical subcontracting groups, had passed through the various committees but had not yet been on the floor of either House or Senate at press time. With Congress rushing to finish the session there was danger the bill would never reach the floor. Committee reports on both bills were highly favorable and recommended passage.

On the road now

Westinghouse's traveling "push-button control" display coach, which began touring the West at Denver, July 6-8, reached San Francisco Aug. 3-13 and goes on to Medford, Portland, Longview, Tacoma, Shelton, Port Angeles, Port Townsend, Seattle Aug. 28-31, and in September to Everett, Bellingham, Salt Lake City and Geneva, ending Sept. 11.

Expanding

Larger quarters have been acquired by the Oregon-Columbia Chapter and the Northwest Line Constructors Chapter of NECA at 535 S.W. Clay St., Portland. Open house was held Friday, July 31. Location has been at 1432 S.W. Sixth Ave. for some years. L. C. Rodgers is manager.

Tighten wording

Better definition of what is a "responsible managing employee or officer" of a contracting firm was to be considered by the California contractors state license board at its meeting in Coronado July 24. Many contracting organizations have felt the need for even stricter definition because of abuses in the past.

Apprentice convention

First North American Conference on Apprenticeship was to start Aug. 2 in San Diego and more than 2,500 delegates from U. S., Canada and Mexico were expected. Labor Secretary Martin Durkin was scheduled to speak and top apprentices to be honored. Section meetings for specific trades were planned. San Diego Chapter, NECA, was active in the local arrangements.

Little left for house

Taxes constitute almost 16% of the cost of a new house now as compared to 2% in 1939, Myron L. Matthews of Dow Service reports in House & Home. In a typical 1,100-sq-ft frame house priced at $15,300 taxes amount to $2,388. For a 720-sq-ft house at $11,800 they average $1,842. This includes all taxes on materials, labor, fees, etc.

Codes and standards

National Electrical Manufacturers Assn. offers its customary analysis of the new National Electrical Code, in this case the 1953 edition, at 25c per copy. Books will be mailed during the week of Sept. 14. . . . Other NEMA news: The first national certified relighting program for commercial and industrial premises has been approved and will soon be launched . . . A rigid steel conduit and electrical metallic tubing section has been formed recently to promote the products manufactured by its members. Members comprise ten of the leading manufacturers . . . New broad standards for more horsepower to a frame size for all a-c electric motors from 1 to 30 hp have been developed. Fewer number of frame sizes to cover the range of horsepowers is another benefit . . . Joint committees with EEI have recently published new standards for equipment used in street and highway lighting, metal head and reflector interchangeability, open reflector mountings and street lighting poles.

Amplify

Electronic shows and conventions will be spouting all over the country this year. Most official one will be at San Francisco Municipal Auditorium Aug. 19-21 when West Coast Electronic Manufacturers Assn. and Institute of Radio Engineers combine for the big show held alternately in northern and southern California each year. Two more, which call themselves National Electronics Conferences, are also announced. One will be at Chicago's Hotel Sherman, Sept. 28-30. The other, just publicized, is to be in Santa Monica at the Pier, Oct. 2-11, sponsored by the Electronic Employers Assn., and evidently is a showing for the general public.

Shows

Other shows include a Home Show in San Francisco Civic Auditorium Sept. 26-Oct. 4, sponsored by Associated Home Builders but the Northern California Electrical Bureau will not be involved this year . . . Refrigeration & Air Conditioning Exposition is scheduled in Cleveland Nov. 9-12.

Keep up on TV

"Television Interference," a booklet issued by Remington Rand will soon be available. It is a third edition of its popular booklet and contains articles reprinted from various electronic and electrical magazines. Copies are available from Remington Rand Inc. at 315 Fourth Ave., New York 10, at 25c.

Corrected

Touchy about its trade-mark brand. "Pyrex," Corning Glass Works corrects us regarding an item in a previous issue. The electric radiant glass heating unit, embodying a panel manufactured by Corning Glass Works, is being produced by Berko Electric Mfg. Co. of Queens Village, N. Y., and is being distributed in northern California by Empire Supply Co. Evidently no manufacture is being done in the West.

High temp. or low

A silicone rubber-insulated wire has been approved by Underwriters' Laboratories for the first time for use in either high or low temperatures. Essex Wire Corp. of Fort Wayne, Ind., has had seven sizes of the new Sil-X wire, with G-E silicone products coating, approved for use in lighting fixtures for temperatures up to 200 C. It is also covered with a special lacquered glass braid. Insulation remains flexible at minus 60 F and retains desirable physical and electrical properties up to 400 F.

Consolidate

Clark Controller Co. has acquired the Fuller-Johnson Corp., which in turn owned and operated American Electric Switch Corp. as well as Good Roads Machinery Corp., Minerva, Ohio. American Electric Switch manufactures safety switches and electric service entrance equipment and will continue to sell these. No change in distributorship is contemplated.

Rewards

Winners of the annual sales contest at Panama Lamp Co. were announced by Guy de Leuze. A. M. Olsen of the company's Los Angeles office won first prize, which was a trip east to visit the Champion Lamp Works and other factories represented by Panama Lamp Co. Second prize went to George Stallman, Seattle, and third to Bob Gordon, San Francisco. Also announced was that Mandle J. Mierbach has been appointed illuminating engineer for the company. He was formerly connected with PG and E, and in consulting engineering practice.

New jobs

Among people this news: Charles A. Dickson moves out of the lighting division of Sylvania Electric Corp. to become Northwest district sales manager of the radio and television division . . . Milton A. Weiner was appointed sales manager of Ruby Lighting Corp. of Los Angeles, a newly created position . . . Joseph L. Noveski was named national sales manager of Sunbeam Lighting Co., Los Angeles. He was formerly with G-E Supply . . . G. L. Call, district manager of supply sales for Graybar Electric in Seattle, has been made branch manager at the Akron, Ohio, office. He is succeeded by George Garland, his former assistant, at Seattle . . . Stelmec Engineers at Oakland announces a new line-up in a brochure just issued. It includes Henry M. Tilson, electrical engineer, Raphael Sampson, civil engineer, Clifford E. Sommarstrom, mechanical engineer, and Sanford W. Fox, mechanical engineer.

First time in West

Sam Russell of H. B. Squires Co., San Francisco, announces that he will now represent the entire Neo-Ray Products Inc. of 315 E. 22nd St., New York, line of commercial lighting equipment. The line includes flush and surface units, louver lighting, and the Mammoth line of 4x4 louvers or plastic panels for flexible architectural treatment.

New wire plant

Wire Co. of America at Goleta, Calif., near Santa Barbara, now coats thermoplastic wire that is Underwriters' Laboratories listed in sizes from No. 14 to No. 8 and hopes soon to increase this to sizes up to 4/0. The new plant is located at the former Marine Airport, which has become an industrial center for Santa Barbara.

Comes West

Another manufacturer comes West. The R. H. Green Inc., manufacturer of specialty items for wiring, originally of Dayton, Ohio, has built a plant in Oakland and moved to it, where all the manufacturing is now done. A new catalog and price list has just been issued. It manufactures reducing washers and locknuts, bracket clips, ground clamps, etc.

More room

Tri-State Supply Corp. is building a new air conditioned building at 544 S. San Pedro St., Los Angeles, where it will add 6,800 sq ft of modern office and warehouse space.

Complete line

Wadsworth Electric Mfg. Co. Inc. of Covington, Ky., has just come out with a line of circuit breakers. This company formerly specialized only in fused panels and switches. The new breakers are a thermomagnetic type with a feature of a red indicator to show when the breaker is tripped.

What's in stock

H. J. Randolph Co., engineering representatives at 736 Santa Anita St., San Gabriel, Calif., has done a novel thing. It has issued a report to its customers as to the items in stock. Represented are S & C Electric Co., Nelson Electric Mfg. Co., T. J. Cope Inc. & Rakit Corp., Trans-Sonics Inc. and Electrical Mfg. Co. And the stock report is something of a catalog of the items carried right close at hand.

Name fits

Eastern Tube & Tool Corp. changed its name to Ettco Wire & Cable Corp. since its principal manufacture is nonmetallic sheathed cable, TW building wire, armored cable, flex and SE cable. It also announced the addition of a thermoplastic building wire to the line. The new wire, it is claimed, strips quickly, pulls easily because lubricated, and is exceptionally resistant to exposure.

Versatile geometry

Architects who viewed the special showing and demonstration of the F. W. Wakefield Brass Co.'s new integrated modular ceilings, called Geometrics, at a meeting of the Producers' Council in San Francisco July 15-16, showed considerable interest in the versatile system. F. I. Wilson, sales manager for the company, was assisted by C. T. Bakeman, representative. The company has just announced formation of Wakefield Lighting Ltd. with factory and offices in London, Ont., for Canadian manufacture.

Wireman's friend

Electrical fittings such as switches and outlets featuring a pressure terminal, which easily accommodates Nos. 14, 12 or 10 wire, are being featured by General Electric Co.'s Wiring Materials Division. A recent meeting in San Francisco of representatives from the West launched the program that combines the Monowatt and G-E Wiring Devices of this nature. Showing was made of the new devices at the Inspectors meeting at Santa Barbara.

UL news

When Herbert G. Ufer retires this fall as Western superintendent for Underwriters' Laboratories Inc., the large area over which he was responsible for field testing, etc., may be split up, it was indicated at the IAEI meeting in Santa Barbara. He introduced Henry J. Chateau to the inspectors, saying the latter would take over the southern part of his territory upon his retirement. Chateau has been with UL in Portland area. No official announcement of the new setup has been made by UL at Chicago as yet. A recent advancement was that of Karl S. Geiges, who has attended several IAEI section meetings in the West, from chief electrical engineer to chief engineer.

Survey for code

What cities require in the way of engineered electrical plans for construction, if any, and under what conditions and who signs them is being asked of 200 of the largest cities in America by Donald M. May, consulting electrical engineer, Los Angeles, to guide the Los Angeles city electrical code committee now revising that city's ordinance.

Plans and parties

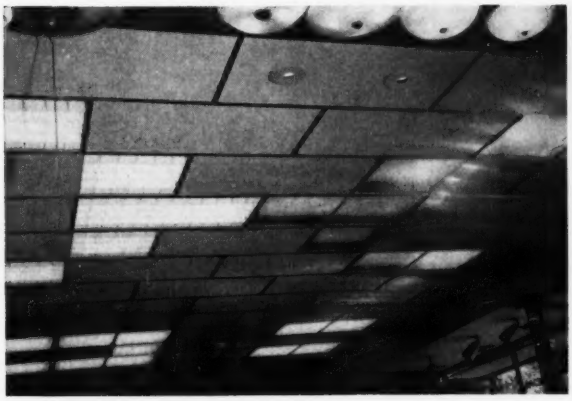
District 8 council meeting to consider the district's agenda for the year ahead was held in conjunction with the Rocky Mountain Chapter of NECA meeting in Cheyenne last month. Charles Simpson, vice-president for District 8, NECA, and who lives in Cheyenne, presided. Other Rocky Mountain Chapter doings lately included an annual Central City, Colo., opera trip, July 18, and the combined NECA-RMEL annual industry picnic at Elitch Gardens, Denver, July 24.

Sell the job

Associated Electrical Contractors of B. C. has launched a business building program to sell the advantages of engaging contractors on a complete-job basis. J. Howard McRae, president of the group, sums up the campaign in the slogan "Final Installed Cost is the Important Cost." AECA was formed in 1948 by seven of the leading electrical contractors of the province. Today there are ten firms in the group, claiming to handle 95% of the major electrical jobs and employing a majority of the union electricians.

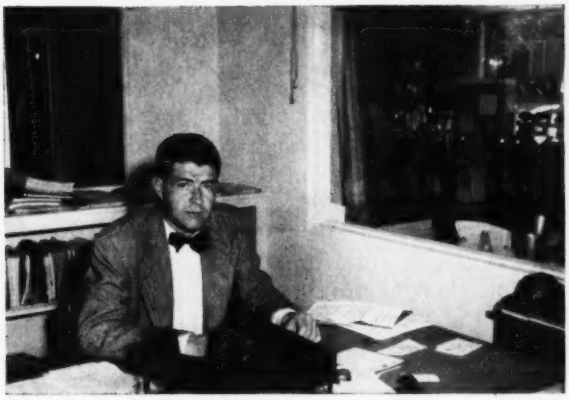
Get acquainted

Architects, engineers, executive heads of industrial and manufacturing enterprises, as well as property management groups, in the Puget Sound area are becoming acquainted with electrical contractors through a promotional program instigated by the Puget Sound Chapter of the NECA. John B. Majerus, executive secretary-manager of the chapter, is directing the campaign with the assistance of Thomas W. Walsh, who was employed as assistant manager recently. Approximately 1,600 individuals and firms are being reached by direct mail and personal contacts.

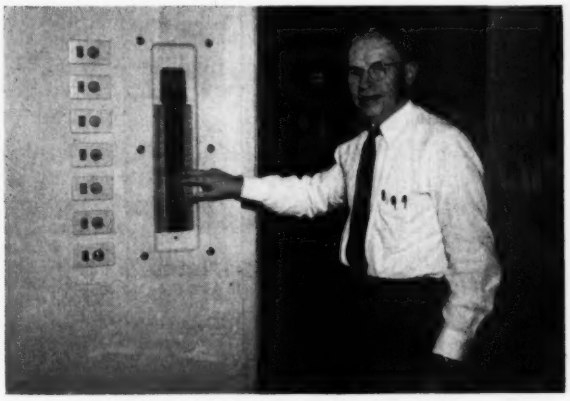


CEILING is used to demonstrate every type of lighting unit

PANELS of Fiberglas are removable as Winston Whitney shows



VIEW into salesroom is afforded Harold Whitney through window



LOW VOLTAGE control of every unit; Matt Whitney at panel

that's how the Whitneys of Colorado Springs

Make the "Overhead" Sell More Light

Large part of the overhead cost of a contracting business is in the office, shop and warehouse necessary to the business. Then why not make that overhead itself pay its way as much as possible? Always a good salesman, Matt Whitney of Colorado Springs just naturally built over his residence that way as he and Mrs. Whitney moved upstairs to a comfortable apartment and the entire downstairs was converted to offices for himself and two sons, Harold and Winston, now in the business with him. A new front was built to the street to become the salesroom. And a long warehouse was built on the rear for materials and trucks. The old kitchen was kept for a coffee bar and lunchroom. What had been the front windows of the house now look into the salesroom either from the accounting office or those of Harold or Winston who are purchaser and estimator respectively. The former dining room is Matt Whitney's office and a conference room when needed.

But it is the salesroom "overhead" that is a sales tool. Before moving from 208 Tejon St., where the store had been since 1913, to the residence at 815 Tejon (in an area now becoming commercial) Matt Whitney planned it all carefully. Suspended from the bar joist roof trusses is a grid of extruded T-shaped aluminum bars on 2-ft centers. On this is supported either sheets of Fiberglas or Day-Brite units. Some are equipped with louvers, some glass, some plastic panels. Some of the panels are equipped with down-spots. At one side of the store outlets for residential units are ranged in rows, 16 to a row.

To demonstrate either the lighting equipment or low-voltage master control all the lighting units are on this G-E system. The relays for each row are at the end of the row. Three fixtures are switched from one setting. Fixtures are connected to duplex receptacles that have two switched wires and a common. For the ceiling panels switching is arranged for three intensities and over the lamp counter as high as 180 f-c can be demonstrated. Altogether entire ceiling is designed for complete flexibility and change.

ELECTRICAL WEST

Build an Atomic Plant Now

A CERTAIN amount of solace plus some definite conclusions can be drawn from the three articles on atomic power which have appeared in ELECTRICAL WEST. Last month's two articles plus the one this month just about wrap up all of the current speculation, knowledge and conclusions on this fascinating subject.

We, along with our readers, can take solace from this statement by University of California's Dr. Lester Reukema: "Although at present the atomic bombs get the headlines, the use of atomic energy for peaceful industrial purposes to satisfy man's power needs for at least millions of years and to give all mankind the high standard of living which is possible only when power is plentiful and economic, is of inestimably greater importance."

Our readers should conclude also with the Pacific Gas and Electric-Bechtel Corp. study and North American's Dr. Sidney Siegel that there should be no further delay in undertaking the construction of an actual atomic power station, whether pilot plant or full size. The cost of such an undertaking in comparison to the billions being spent on atomic developments and research for war-like purposes would be small. The benefits to humanity, however, might be far greater than those to be derived from more bombs or an atom-powered submarine, carrier or airplane.

History Could Repeat Itself

CAN it be that a more or less inevitable cycle is being completed by the PUDs in the Pacific Northwest? Certainly the increasing talk of mergers, super-PUDs and even a state-wide, all-inclusive power organization leads to that conclusion. If such is the case then the history of the utility business is repeating itself.

In its beginnings electric service was furnished by thousands of small, isolated, independent, inefficient and sometimes competitive units. Ultimately the advantage of consolidation brought about certain logical geographical groupings into highly integrated and efficient operating organizations which were monopolistic in character because of the very nature of the public service they performed.

The burgeoning public power movement in the Pacific Northwest, especially in Washington, changed all that beginning a couple of decades ago. Utilities that had been painstakingly put together over the years began being chopped up into small county-wide or even smaller units. These naturally were less efficient, were constricted and restricted in their operations and suffered by contrast with their previous integrated, professionally managed amalgamations.

Now there is promise of a change. Once again the benefits and advantages of consolidation have become attractive. So history may repeat itself.

Time for Cheers, not Fears

THE avowed intent of the present national administration to tighten the federal purse-strings, even for public power developments, has brought some contrasting and significant reactions in the Pacific Northwest. The red-hot public power zealots, crusaders and propagandizers are raising a fearful hue and cry over the potential loss of this federal munificence. Their protests, agitations and proposals bring back memories of 20 years ago. Having obtained and enjoyed something-for-nothing, they cannot bear to see it taken away from them. And they envision the dire consequences of future power shortages brought about by curtailed federal expenditures.

Contrasted to this attitude is the forthright enterprise and energy of another group of power agencies who are fed up with the bureaucracy, paternalism and domination of a federal superpower giant. Instead of wailing and waiting for a resumption of federal beneficence, this group is going about its business of providing the region

EDITORIAL VIEWS

with adequate and economical power supplies. The list is noteworthy: Washington Water Power with 770,000 kw of new capacity under study; Tacoma with its 460,000-kw Cowlitz project; Northwestern Electric diligently developing the Lewis River; Seattle City Light adding to its Skagit facilities; Portland General Electric with its ideas for additional steam capacity; Grant County PUD and its associates with the 1,000,000-kw Priest Rapids project; Idaho Power ready to build 772,000 kw of new plants on the Snake River in record time; California Oregon Power doubling its generating capacity.

In the light of these developments the people of the Pacific Northwest need have no fears for their future power supplies despite the dire predictions of Grangers and Farmers Union public power stalwarts. The region should be glad that it has enterprising local power utilities who know their business and who go about doing it.

Strange Things Are Happening

DISTRIBUTION of goods is performing some of the oddest tricks and twists these days. Nor is it only in the appliance field, where either a revolution or just plain chaos is ensuing. Similar distortions of old familiar patterns of distribution in the supplies and equipment field are to be seen.

In one important Western city an enterprising electrical contractor has gone into the wholesale business of supplies because he says he wants something he can sell. As a contractor, he claims, he can no longer compete with the distributors who sell supplies direct to his customers and leave him only a labor brokerage business in contracting. All the supply wholesalers say they sell to industrials and commercial customers because their competitors do so. And an antitrust case in the midwest recently makes it plain no one can agree not to sell anybody anything.

What seems to be going on is that everyone is getting into the other's business to give away its profit to get a meager one from his own. Dig that *crazy* distribution!

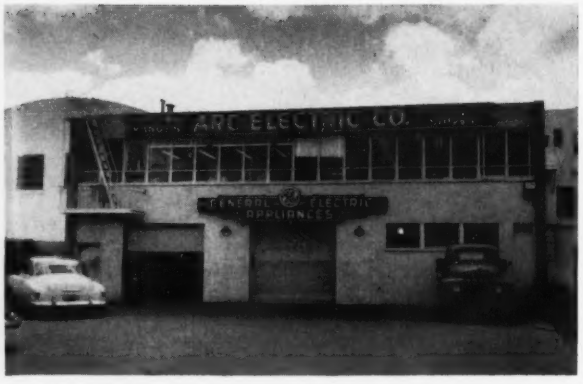
Take it in Stride

ROOM coolers, which grew out of the evaporative coolers pioneered in the dry hot regions of the West and are now swinging to refrigerated window unit types in what amounts to a boom, are causing headaches to utilities, our contemporary, *Electrical World* points out. But then, hasn't every new electrical device that found sudden public demand—electric heating, fluorescent lighting, television, arc welders? The list could include many more. Even the first large motors gave the engineers unhappy hours of anticipated trouble that seldom happened. To be sure there are difficulties, both for the utility and the user in this new electrical boon to living comfort, but let's take them in stride.

You Can Say That Again

NOW, menacing as is the aspect of affairs in the East, we do not expect the peace to be broken . . . since it is the characteristic of Russian diplomacy to be as pliant as it is encroaching, and always to recede before a resolute front and an enterprise of doubtful and hazardous result. Russia never abandons a design, but is always ready to postpone it, if need be, to a more convenient season; she is as patient as she is pugnacious; and will never risk her plum by endeavoring to gather it before it is ripe. The question, therefore, whether she will now persist in her demands, will depend on the nature and degree of the resistance she may meet with . . . Both in the East and in the West, then, a case has arisen to test—prospectively at least —the fidelity of England and France to their several engagements, their power of sincere and cordial cooperation, and the courage, vigor and capacity of their respective governments. — From "The Economist" (London), June 4, 1853.

BOW opens on Mission St. with all-glass display window front



STERN parking lot opens on Alemany Blvd. at basement level

Three Brothers and Their Arc

Noah, with a pair of everything aboard the Ark, was not as well fixed as the three Menicucci brothers, Guido, Arthur and Frank, who for 30 years have built up Arc Electric Co. in San Francisco. Until last year the main store was at 4792 Mission. But now Arc occupies its own building at 4750 Mission. Into it went the results of those 30 years of experience in operating a strongly merchandising type of all-round electrical business. The pictures here illustrate how each part of the building serves a merchandising or selling purpose.

The location—it is in the center of a residential and small business district that had 60,000 food stamp books, or family groups, in it. The building—55-ft frontage of glass display windows and 147-ft depth has two stories and basement on Mission St., two at the back with sun deck. Front top floor was leased to Prudential Insurance Co., which brings a lot of street traffic by its windows. Stock—is selected with a keen understanding of the tastes and needs of the district. Because many living there like to do their own work or repairing, Arc has the materials and parts they need and sells them. The do-it-himself customer is helped and made welcome. But he is also shown the difference between the cheapest devices and the better grade and nearly always buys the latter. If he needs a competent job done by professional electricians. Arc has them ready to go on the job promptly. By taking care of the service on appliances sold by the store good will is built for future sales and many customers are truly loyal, Guido Menicucci finds.

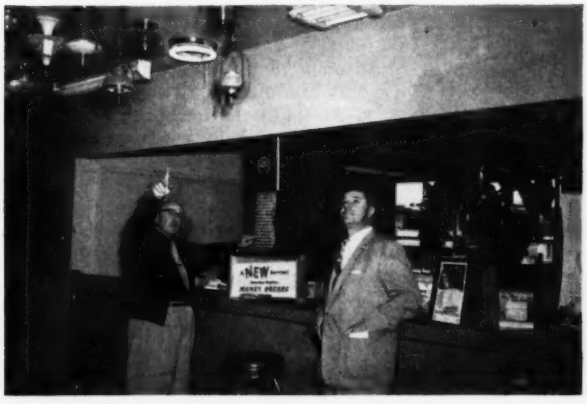
Order has sales value too. It builds confidence when customers see it so obviously. From the proprietor's viewpoint it has many advantages. It makes for efficient operation, saves time, immediate access to stock, reduces depreciation. Arc Electric is clean and orderly even in the repair shop. And a perpetual stock record of everything bought, held and sold, and to whom and when, pays off in a live prospect list.

REPAIR SERVICE desk at basement front displays parts and accessories that customers can either buy to install themselves or that are used by the service department in making repairs for appliances brought in. In the shelves parts are neatly kept in bread pans, each labeled with name and number. Complete record is kept of every item sold to aid in inventory refilling

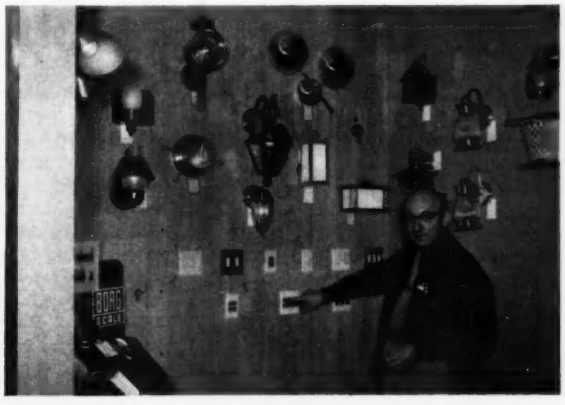
WIRING MATERIALS are also merchandised. Arthur superintends the wiring department, which has seven trucks on construction, two on service and fixture work and operates from a separate warehouse and office at London and Russia Sts. But a stock of wiring materials is carried in the basement at the store for sale to the public, as Arthur here shows, withdrawing a carton

APPLIANCES and TV sets occupy all but the rear office and stock shelf area of the 7,000-sq-ft main floor and lighting fixtures, mostly residential, the entire ceiling and live demonstration is possible of everything. Small items are displayed on self-service tables near the store's rear sales counter

LIVE DEMONSTRATION of major appliances is provided by wiring and plumbing facilities along the wall. Frank Menicucci, at right, has charge of appliance sales. Store demonstrations and cooking schools are frequent and publicized to the 60,000-family Excelsior district in which the store is centrally located



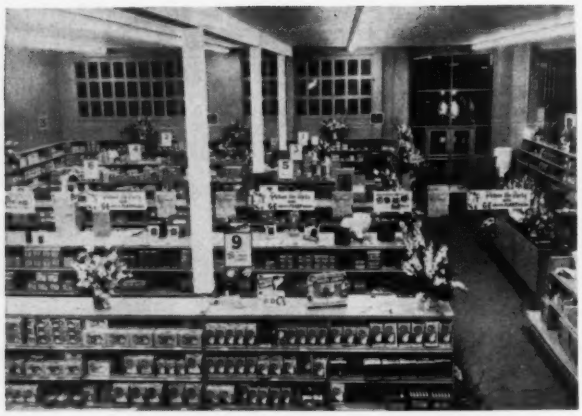
PUSH-BUTTON boards at nine stations in the store, with a total of 650 buttons, provide low-voltage relay means to turn on individually any or all of the sample fixtures on the ceiling and walls. Guido Menicucci, manager, shows Chick Vattuone of California Electric Supply how customers can try the lighting

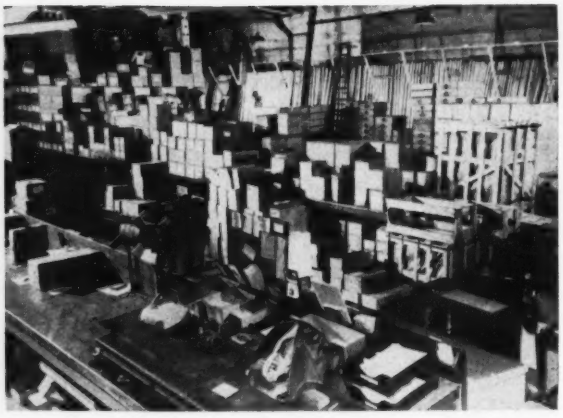


MASTER-CONTROL stations of Touchplate low voltage are demonstrated by Guido at one section where porch-light units are mounted and can be used to tell customers how all or any single lighting unit in a home or garage can be lighted from master-control panels in bedroom, garage or living room, through relays

SHOP for repair of appliances is a model of orderliness and cleanliness, with tools in place and parts and fittings within easy access. The exposed wiring in conduit in the basement area also serves to demonstrate good workmanship to customers. There is a fixture assembly shop adjacent to this, likewise, and supplies of parts and fittings grouped there for convenience

TOOLS are neatly racked as is seen in this portion of the wiring shop. Conduit benders fit into pipes as scabbards and are ranged in size. Wire measuring equipment is below. Note the pushcart made of tubing on which to assemble materials for a job in a labeled carton that is then put on a deep shelf near the delivery entrance. Push buttons control all shelf lights





With all stock on shelves in plain view and even the warehouse arranged for pickup by cart, Northwest Electric Supply goes into . . .

Distributor Style Supermart

A supermarket type of display and handling, long a desire of the management of Northwest Electric Supply Co., was made possible when that company outgrew its former quarters at 715 N.E. Davis St., Portland 14, and moved to much larger quarters at S.E. 7th and Alder Sts. recently. Limited area in the original quarters made this impossible.

The new building, all on one floor, was especially suitable for conversion to this type of operation, a partition through a section of the building established a self-service area. Market shelves were installed throughout this area and a check-out type of stand rather than a counter was installed.

A customer entering the store is not abandoned to self-service, however, but is greeted by an inside salesman. The inside salesman, pushing a shopping basket, walks with the customer to the merchandise requested, takes it from the shelf, puts it in the basket. This offers the floor salesman an opportunity as he goes in and out of the aisles to point out extra value merchandise and to give short sales pitches on special merchandise, attractive for various reasons to the customer. This sales system has already proved to result in many extra sales dollars.

Displayed on the floor area is every type of merchandise, including wire and conduit sold to the electrical contractor or dealer and industrial customer. Although some of these displays, like wire and conduit, are limited and occupy only a small space, the displays serve as reminders to the customers and to the salesmen. This point-of-sale merchandising is so well established it is a wonder it has not been more universally adopted in the wholesale electrical industry, says G. W. Exel, one of the partners in the firm.

Other ways in which this operation has benefited has been that order fillers from the shipping department enjoy the advantage of pushing their order carts through well-lighted, open displays with merchandise easily within reach and plainly in view. This is a distinct advantage to them in cutting down errors in filling orders and speeding the time required to fill them.

In many cases a manufacturer's entire product is stocked and displayed in the main supermarket merchandising area. In other instances, the main stock is in the warehouse but easily reached from the main sales floor through large double swinging doors.

One employee is charged with the responsibility of maintaining merchandise on the shelves, keeping it tagged and the bins and shelves clearly labeled.

Other features of the new place are large loading doors in the front and rear of the building for customers. Adjacent to the front entrance are two large loading doors and the entire area is a loading zone for use in loading and unloading trucks only. The large customer parking lot at the rear of the building is also served with additional loading and entrance doors.

Since the open house and showing to the electrical industry in Portland, other wholesalers have declared intention to convert their operations to this method of merchandising.

The owners, G. W. Exel, left, and G. R. Phillips, right, and their wives at opening

ELECTRICAL WEST Sales Guide

News Letter

August 1953 ©

FOR THE ELECTRICAL MERCHANT OF THE WEST

Could be that the early rush to hold manufacturer showings of new lines made going to the Western Home Goods Market in San Francisco, July 20-24, unnecessary. But whatever it was, it was a pretty quiet market, to put it kindly. Even the day of the appliance and radio-TV trade dinner, usually the busiest for the 4th floor, was nothing like it has been. However some exhibitors said that while dealers came in dribbles they came to do business, not just look. In fact they had already seen the new lines. (See next issue for story and pictures.)

Premature previews

Nothing much new in lines or products either. Wedgewood's new gas or electric clothes dryer probably attracted the most attention. It is made by Rheem and with Wedgewood's dealers should do well. . . Hamilton's new automatic washer to go with its dryer was shown for the last two days of the show. Dryers seemed to be the fad line this market.

Nothing sensational

Big news of Crosley taking unto itself the Bendix line of home appliances broke at market time, though it was in the making before. When L. J. Meyberg announced ditching the Bendix line speculation was plenty as to who would get it. When Crosley announced that its distributors would take the line, it started one more of these musical-chairs affairs by former Bendix distributors for other white goods, particularly washer and dryer lines. American Kitchens, another Avco-owned line, will remain independent, Avco announced. At one time Avco envisioned three separate full lines--Bendix, Crosley and American Kitchens. This consolidation reflects an industry-wide trend to try to consolidate position after fabulous expansion.

Another big switch

Dealers are in a three-horned dilemma in such changes. Whether to follow the line to a new distributor or take the line of the distributor who must shift to a different line and whether to take the full line of a manufacturer who has only developed a public acceptance on one appliance but nobody knows a thing about the rest of his new line--those are the questions. Loyalty clashes with self-interest.

Which way for dealer?

Speakers at the appliance dinner, July 22, were on a different note. Muriel Tsvetkoff, manager of San Francisco Better Business Bureau, gave some much-needed but little-liked advice about tricky advertising and false claims, citing some of the abuses of the freezer plan hot-shots last year. Economist Dr. Haake pleaded for a little pride of craftsmanship in all business again, not mere mechanical production. Banker O. W. Frieberg, at the press luncheon, said there was plenty of credit available but not for speculative purposes.

Business cleanser

Fall conferences

September is going to be a busy month, meeting-wise. Fall conference of San Diego Bureau of Home Appliances is scheduled for Sept. 16 in San Diego. . . Rocky Mountain Electrical League holds its annual convention at Colorado Springs, Broadmoor, Sept. 21-23. . . Northwest Appliance & TV Assn. holds its first big dealer meeting at the Norselander, Sept. 27-28. . . Inland Empire Electric League holds a big meeting about Sept. 22. . . Appliance Merchandisers Assn. in Phoenix holds its annual TV show Sept. 24-26. . . Probably many other smaller gatherings as the fall season starts with a rush.

Lineup

The Seattle affair will have quite a lineup of speakers. Mort Farr, past president, NARDA; A. W. Bernsohn, managing director of NARDA; and Wallace Johnson, president, NARDA, are all scheduled to be there. P. S. Urner, a director from Bakersfield, and Kip Anger, national promotion manager for Motorola, are announced by Ed Smith, secretary.

League changes

Another change in the management of the Appliance Merchandisers Assn. in Phoenix takes place as Bill Cowdry leaves to take over as a principal in a new manufacturing firm making detergents under the trade name of Sparkle. News of a successor has not been announced. . . In Spokane Dan Peterson, assistant secretary at Inland Empire Electric League, has resigned and is to be succeeded by Mel Deahlberg.

Boise elects

Paul Mills was elected president of the Boise TV & Appliance Assn. Earl Haroldsen, outgoing president, becomes secretary; W. H. Hill, chairman of appliance commission; Bob Latha, TV chairman; Drew Joslyn, service chairman; and Hugh Shelley, information chairman. Harold Aggeler is treasurer.

So does Sacramento

Chet Coppin, owner of Lam-co Electric, has been elected president of Sacramento Valley Electric League. Bob Olson of Sears, Roebuck is new vice-chairman and board members are Keith Kirstein, E. M. Kemp and Jay Kaspari. George L. Cain remains as secretary.

Dealers organize

En route to and returning from the IAEL convention in San Francisco Al Bernsohn, managing director, NARDA, held meetings with member groups in Cheyenne late in July, Salt Lake City and then in San Francisco, Alameda and Contra Costa Counties, at Oakland and Chico. At Cheyenne H. A. Jensen, Ranchers Gas & Electric Co., spearheaded the meeting. In Salt Lake City an Intermountain Chapter was formed with Clarence Gilman as chairman. In San Francisco Carl Hagstrom, General Appliance Co., organized a meeting and in Oakland Evelyth Hayden, NARDA representative in the West, is secretary of an Alameda-Contra Costa group. At Chico John Hodkins of Paradise, Calif., is chairman.

Ownership deals

Easy Washing Machine Corp. is undergoing change in ownership. Sale of 50% of the Derschug estate holdings was made to Murchison Brothers, an investment partnership of Dallas, Tex., and two of the latter's executives were put on the board of directors. Another ownership change is indicated in a release from Nesco Inc. saying that Nesco "is the most recent interest of Industrialist Louis E. Wolfson and his associates."

Top shifts

Among the changes made by top-level events are these: The Crosley-Bendix merger of sales departments probably resulted in the announcement that F. F. Duggan, general sales manager of major appliances, has returned to Deepfreeze as vice-president and general manager as L. J. Sorensen is elevated to executive vice-president. . . At Thor Corp., death of John R. Hurley in June brings the election of Henry C. Buckingham to the presidency of Thor. Buckingham, born in London, has been general manager of the Canadian subsidiary.

Westinghouse's laundry-twin "Blessed Event Day" last year was such a blessed event sales-wise it is to be repeated. The date is Sept. 23 and twins born that day will receive a set of the new appliances plus a year's supply of baby food. Last year there were 303 sets of laundry equipment presented and California with 41 led the nation.

Twins again

More plant expansions going on: Billings Wholesale at Fresno is enlarging its warehouse and office space. . . Western Division of Sunroc Co. has moved to larger quarters at 2216 W. 11th St., Los Angeles. . . F. B. Connelly Co. of Oregon has taken on a warehouse in Medford to maintain stock of Sylvania TV. . . Horn & Cox Inc. in Los Angeles has started construction of a new building on a three-acre site, just off the Santa Ana Freeway.

New and larger

Two new distributors to handle Revco food freezers in the Northwestern states have been announced. Valco Distributors, 125 Stevens St. S., Spokane, owned by L. K. Vallandingham and Mrs. Shirley Hanson, is one. In New Westminster, B. C., United Distributors Ltd., owned by Stanley Wright and Jack Phillips. . . Another RCA shift is to Crawford-Miller-Woodbury Co. as distributor for Portland, Ore., area. That line was formerly handled by Harper-Megee Co. Whether the latter would take on Crosley along with Bendix was uncertain following that change. . . In San Francisco, California Electric Supply takes over Bendix from Leo J. Meyberg. It has had Crosley. . . Graybar has been named a distributor for Westinghouse housewares in the Los Angeles district. In San Francisco, Pacific Wholesale Co. was also named a Westinghouse housewares and bed-covering distributor. . . McCormack & Co., San Francisco, now handles the Phonola portable phonograph line.

Who has what

Among new products recently announced for fall and winter selling are these: Rival Mfg. has a revolving barbecue called Whirl-A-Gig to fit any electric broiler-rotisserie, which increases the versatility six times. . . Radex Corp. of Chicago is putting on the market a portable, cabinet-type electrostatic room air cleaner, called Dustronic. Formerly installations of this type were only built-in jobs in complete air conditioning systems. The Dustronic offers relief to hay fever and dust-allergy victims. . . Westinghouse is bringing out three new low-cost appliances--a Laundromat, a dryer and range. Both dryer and range will sell at $199.95 and the Laundromat at $249.95. . . A streamlined electric tank-type cleaner, called "Holiday," has been introduced by the Hoover Co. to retail at $79.95. It is very small and compact. . Eureka offers a hassock-chest that doubles as a TV seat to go with its Roto-Matic canister-type cleaner. . . To be in dealers' hands by September for Christmas trade are four new General Mills appliances--a mixer, combination sandwich grill, coffee maker and deep fat fryer and cooker. The mixer features a timer. They were shown at a General Mills press luncheon to release the company's annual report. Henry S. Kingman Jr., district manager, home appliance department, made the presentation. . . Easy Washing Machine finally made a showing of its new automatic washer and automatic dryer combination with its Spiralator and spin-dryer features. The washer will retail at $289.95. Electric dryer at $239.95. . . Camfield Mfg. Co. introduced a new all-automatic coffee maker for small families or offices, to sell at $24.95. . . Oster has a new de luxe portable mixer with a knee action for the beaters, has three speeds.

Brand new

Price increases were announced by General Electric on 11 models of its range line, and by Servel for its entire line. Admiral increased prices of electric ranges $10 and $20 in two 40-in. models, bringing the prices to $369.95 and $419.95 respectively.

Up a notch

In this changing business, these moves were made recently: Louis D. Stull, who went east to Cleveland recently as national sales manager for Apex-Rotarex Corp., didn't like the east and returned to Los Angeles where he was appointed general sales manager of Pacific Appliance Distributors. . . With the removal of the Bendix line from Leo J. Meyberg Co., Herb G. Atwater who had been product manager for that division became advertising and sales promotion manager as P. S. Wickstrom resigned. . . Joe B. Chapman, formerly with G-E commercial refrigeration, has joined Barr Mfg. Co., maker of commercial reach-in and walk-in cases, Oakland, which is increasing its distribution. . . As Ed Curry, who was sales promotion manager of Hoffman Sales Corp. of Oregon in Portland, moved to Denver as regional manager, George Shepherd Jr. of the First National Bank took over the job in Portland. . . Cecil H. Boyd, president, Boyd Distributing Co., promoted Bill Coddington, former southern Colorado territory manager at Colorado Springs, to major appliance sales manager in Denver and Bill Newton, northern Colorado manager, replaces Coddington at Colorado Springs. Joe Mongold has been transferred from the Wyoming area to northern Colorado and Robert Link, advertising manager, has been placed in charge of the Wyoming-Nebraska territory. R. L. Harbaugh, general sales manager, will take on advertising and promotion in addition to his other duties. . . J. Ralph Slonaker has been made sales manager of the Seattle branch of Crosley distributing division. . . Bert W. Reynolds, until last year district manager of the appliance sales division and East Bay manager of G-E Supply, is the new manager of the Gas Appliance Society of California. . . W. J. Moller has been made sales manager of Emerson radio and TV for Century Distributing Co., Los Angeles. . . Al Jewell, Graybar Electric, San Diego, has been promoted and transferred to the Los Angeles headquarters as assistant appliance sales manager.

Men move

Also from San Diego comes word that Al Ginn, A. O. Smith Co. representative, has been made sales manager for M. O. Haldemann Co., distributors of A. O. Smith products. Also that R. L. Read represents Sparton TV and radio in San Diego and James N. Daldry, Packard-Bell representative, retires but Tom Talmadge will carry on the business from the same location. . . Herschel Johnson joins Schafer-Wright Co., distributor of Coolerator. He was formerly Coolerator West Coast district manager.

and

Among distributor changes: The Keefe Auto Supply Co. has been made distributor for Emerson radio-phonograph in Montana and northern Wyoming, with headquarters in Billings. . . Hoffman Radio Corp. has appointed Carter McIllroy Johnson Inc. as western Washington distributor.

lines

Graybar now distributes Raytheon in San Diego. . . Admiral has appointed Pacific Appliance Distributors Inc. for three counties--Santa Barbara, San Luis Obispo and Ventura of California. . . RCA Victor has named a new distributor in Denver, the Ward Terry & Co.

too

Some move in, some move out. Thomson-Diggs Co. has moved out of Western Merchandise Mart to a new location at 424 Townsend St., San Francisco, with larger showroom and parking facilities. It distributes International Harvester refrigerators and home freezers, Bendix TV, Magic Chef electric and gas ranges, Blackstone washers, Hobart Kitchen-Aid dishwashers, etc. . . On the other hand, Arthur C. Maryon Co. has moved into the Mart with an office strictly as a manufacturer's representative for Conlon, having given up the Kay-Halbert line. . . Walter J. Epstein Inc., Ben Hur and Phoenix representative, has done the same and given up warehousing for a public warehouse arrangement. The Mart management expects General Electric Appliance Division to move West Coast offices from the Russ Building, San Francisco, to the Mart.

So do reps

With actual appliances contributed by the distributors mechanics learn all makes and

by taking them apart, how to repair them at Opportunity School, as Denver now . . .

Trains for the Automatics

More automatic appliances are sold today. This brings a need for more skilled service mechanics who know how to take care of them. Most everywhere this is left to chance. In one or two places an organized effort is being made to answer this need. One of these is Denver.

In Denver an association of appliance service and installation men has been formed since last February for all people connected with installation, repair service and rebuilding of appliances. This includes the service managers of manufacturers or distributors and the servicemen themselves.

This organization now sponsors a series of Monday-night service schools in cooperation both with the Denver vocational school, "Opportunity School," and with the distributors and factory representatives of automatic appliances.

Officers of the organization are John Sisson, Sisson & Sons Appliances of Englewood, a suburb of Denver, president; Aud Hanna of Ray Jones Washing Machine Co., vice-president; R. Lee O'Neal, General Electric Supply Co., secretary; and Jack Absher, Absher Washer Repair Co., a director. The association is affiliated with the Rocky Mountain Electrical League as a subdivision of the appliance section.

Its purposes are to raise the standards of service by education of service personnel, to promote acceptance and utilization of automatic appliances through better service, to distribute technical data and exchange individual ideas for the improvement of service and to limit its membership to men of the highest integrity based on dependability and fair business practices. The organization has no trade union ties whatever.

To go back to the beginning, the organization is an outgrowth of a study made by Ray Jones, who has been chairman during the past year of the Manufacturers' Relations Committee of the Appliance Parts Jobbers Assn. Inc., a national organization of repair parts supply houses.

After making a trip throughout the West as the means of making a survey of service shop operation policies and conditions, Jones made a comprehensive report to the last convention of the Appliance Parts Jobbers Assn. Out of it came a resolution, which was passed by the organization, and which may be summarized as follows:

That the association offer to assume the responsibility of complete service or actively sponsor such service and to assist in training and perpetuating a competent service force for any and all manufacturers, local distributors and dealers. This would be done by members who are authorized parts outlets, if and when called upon to do so.

The program recommended supplementing with clinics at which instructions on service be given to all interested parties. Literature, booklets, manuals, etc., would be furnished on an actual cost basis to the end that service would be improved. The benefit to the manufacturer would be increased acceptance of his products.

Qualified instructors were recommended and full use of available service information from manufacturers for text material. It was recommended also that certificates of competence on each and every line of appliance be given those men who complete a prescribed course of training. The courses

would be written by factory service personnel or under their supervision.

Another recommendation was that the individual parts jobbers, as an association but acting individually, sponsor local organizations of qualified service and installation men, offering a limited association membership.

Returning home, Jones went to work to organize this program in Denver and the Appliance Service Assn. is the result. Some 35 servicemen from dealers, distributors and independent service organizations have been attending classes on Monday evenings. The manufacturers have cooperated by furnishing washers to work with, as well as supplying service manuals and parts. The distributors have offered the use of their showrooms and model kitchens as classrooms and provided the lighting and facilities.

So far the training is separate from factory training offered only to franchised dealers but the purpose is to create a pool of experienced mechanics who can be employed by any of the shops and service stations.

The first meeting in February was attended by six major appliance distributor representatives, representatives of Public Service of Colorado, the RMEL, dealers and of the public schools. The need was universally felt for training in automatic washer repairs, dryers, dishwashers, disposals, and that the first course would be on automatic washers.

An advisory board was set up with Ray Jones as chairman; Carl Anderson of R. F. Clark Co., Blackstone distributor; D. D. Walsher, Western Appliance, Whirlpool distributor; H. H. Peterson, Maytag Rocky Mountain Co.; John Sisson, dealer; T. M. Foulk, Public Service of Colorado; and Ted Leisenring, Denver public schools, Division of Adult Education.

Instructors from the industry selected included Aud Hanna, Ray Jones Washing Machine Co.; Ralph McMichael of Consolidated Services; Daryl Benson of Becker Appliances; Leonard Bernicker, Public Service of Colorado; John Hamilton of Western Appliances; and Leonard Smith of the Denver schools.

A room at the public school was wired and plumbed for classes so that six makes of washers can be taught simultaneously. The servicemen work in groups of three on each washer at a time. The instruction covers everything that a serviceman should know and even includes going to the home to uncrate, inspect, install and set in operation an automatic appliance. Then repairing is taught. Also taught are ethics, customer relations, the sales features of the machine to talk about.

No tuition fee is charged those who live in Denver and a small charge only for those outside the city.

"Before the advent of the automatic washer," said Jones, "we were able to do a pretty creditable job in some areas as both parts jobbers and service organizations, and in others as parts depots only. The real question then became should we as an organization adopt a policy on a national basis or should we continue to let local conditions dictate the policy of each member individually."

Makes Service Survey

It was to feel out the views of members throughout the country that Jones made his trip. He visited Portland, where he met with Wesley May, past president of the organization, and then to Seattle, Los Angeles and San Francisco. On his return, he stopped at Salt Lake City. He also visited some nonmembers and saw the Western district managers of two major manufacturers of washing machines, discussing parts and service problems with them.

Among the things he found were that service shops were doing complete service jobs for from one to five factories, and a partial job nonexclusively on others. Some make in-warranty replacements, depending on local conditions and requirements of the several manufacturers. Installations are not being made by many but where being done are as a rule satisfactory.

He found that charges for complete installation and warranty depend on local labor conditions but with increased wage demands prices rendered compared to automotive, refrigeration, television and other service were too low and should somehow be increased. As such under present conditions service has not been a profitable phase of the business to any of the jobber members, he found.

Because of the many complications involved as to population, labor conditions and extent of investment required, and other factors, his report indicated no agreement as to how far the parts jobbers association should go toward attempting to supply complete service for manufacturers on an exclusive basis. Another difficulty was the lack of appreciation on the part of some manufacturers of the service responsibility and lack of a parts distributing policy conducive to good service. Such a lack has caused a good deal of customer dissatisfaction, delays in service and harm to the trade name.

However, Denver is doing its part to create a pool of trained service personnel to keep the customers happy at the local level.

Trades Favor Electric

A trade-in plan on electric and gas range sales is nearing a successful conclusion in the B. C. Electric Co. territory, both on the mainland and on Vancouver Island. Dealers make all the sales, but B. C. Electric makes a trade-in allowance of $12 for an old range, either wood, coal, oil, gas, electric or sawdust, where replaced by a modern range, either electric or gas. The object is to sell and install as many modern electric and gas ranges as possible where the owner formerly used some other fuel or to replace old-style, inefficient electric or gas ranges with modern ones. It also provides for the scrapping of traded-in ranges to remove the possibility of their coming back on the used-range market.

The program began April 1 and ran through June 30. Manufacturers and distributors of 16 electric and 9 gas ranges participated with the B. C. Electric. Under the conditions of the plan, what constitutes a new range is specified as well as what condition the old range must be in, and dealers are required to deliver the trade-in ranges at their own expense, identified with a special tag, to a junkyard designated in either Vancouver or Victoria. The company representative sees personally that these old ranges are smashed up.

A tag in three parts is used in designating the trade-in range. The first part numbered gives the dealer's name and date and is tied to the range. The middle part makes notation of the traded-in range as to its type, make, model, serial number, customer's name and address, and of the new sale and distributor from whom obtained. The receipt for the traded-in range forms the third part. Where multiple sales are made, such as in replacing ranges in an apartment house, $6 is allowed for each range over three.

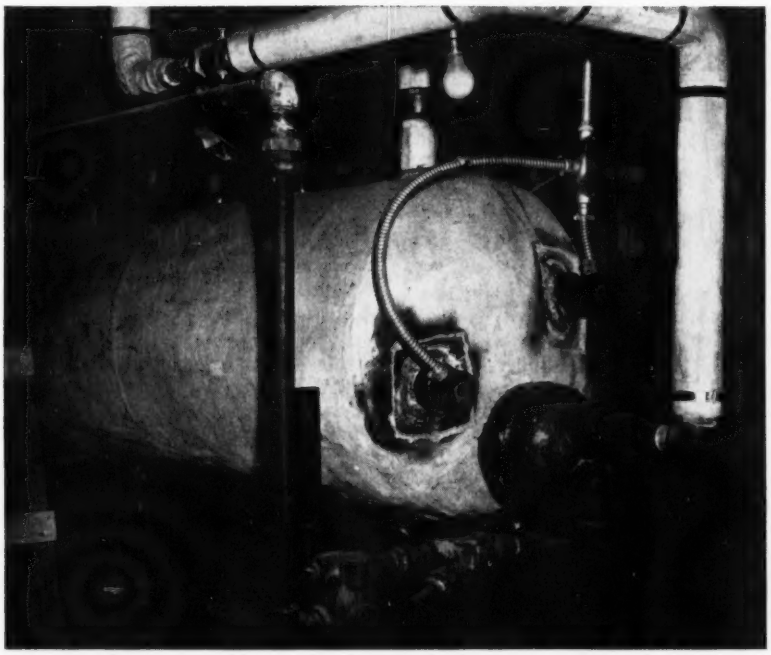
Interesting results from the first month of operation were as follows: There were 93 electric ranges out of a 154 total sold. Turned in on electric ranges were 18 old electric, 12 gas, 9 oil, 41 coal and wood, and 13 sawdust ranges. Turned in on new gas ranges were 12 gas, 8 oil, 38 coal and wood, and 3 sawdust.

Prior to the range campaign a successful clothes dryer campaign was run with a sales contest among dealer salesmen. Fourteen distributors and B. C. Electric cooperated in furnishing prizes for every clothes dryer sold and a grand prize drawn from cards turned in by salesmen upon the completion of each sale.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 90

SUBJECT :	Water Heating
CUSTOMER:	Coeur d'Alene Home for the Aged
TYPE OF BUSINESS:	Old Folks Home
SERVICE COMPANY:	The Washington Water Power Co.
DATA SHEET PREPARED BY:	W. A. Lowry



Hot water tank is inexpensively converted from steam to electric by immersion heaters

The Coeur d'Alene home for the aged needed an adequate supply of hot water at a minimum cost. The owners' coal-fired boiler was inadequate during extremely cold weather. They also wished to shut down their boiler during the summer months to save the cost of an engineer. Available space in the boiler room to install auxiliary water heating equipment and the cost of installation were to be the prime considerations.

The coal-fired boiler had performed the job of air heating and water heating until a recent addition to the building was finished. Now the plant could not furnish all the requirements for 85 residents. The hot water tank was a 300-gal insulated tank with the conventional steam coil. Location of the boiler room, the premium on space and the available money all indicated one solution.

Two immersion heaters were installed: one Chromalox M 390 (9 kw) and one Chromalox M 360 (6 kw), both 240-v, single-phase elements, in the existing tank. The only plumbing requirement was the cutting of two 3-in. openings and welding on the fittings. An AR 2514 thermostat activates two magnetic contactors. The 6-kw heater is also controlled by a time clock. This control feature is necessary to make the installation eligible for the company's special water heating rate. A further qualification for this rate in installations larger than 100 gal is that the booster heater shall not exceed 40 w/gal and the base unit shall not exceed 20 w/gal. These qualifications are met, along with company-approved plumbing and wiring, which qualifies the installation to receive a rate of 8 m/kwh with no demand charge.

This installation, which supplements the boiler in winter and does the entire job in the summer, has provided a continuous supply of hot water both winter and summer. It has permitted the owners to shut down the central heating plant and free their maintenance man when he is urgently needed for seasonal work. They are secure in the knowledge that a boiler breakdown will not affect their hot water supply. The entire installation was accomplished at a cost of $392 without using any additional space. Cost of operation has been exceptionally low, averaging $1 per month per person when all hot water is furnished electrically.

Operating Data

Connected load 15 kw—bottom unit 6 kw time-clock controlled during four-hour peak period. Both are 230-v heaters, operating at 246 v. Kilowatt-hour consumption for preceding 12 months: 4/14/52, 1,960; 5/6/52, 2,446; 6/5/52, 5,492; 7/7/52, 5,760; 8/6/52, 10,020; 9/5/52, 10,196; 10/7/52, 8,908; 11/5/52, 5,180; 12/5/52, 2,740; 1/6/53, 2,060; 2/5/53, 1,340; 3/8/53, 1,140.

The high kilowatt-hour usage during the summer months can be explained by stating that the two heaters, 9 kw and 6 kw, are rated at 230 v but are operating at 246 v. Temperature of the feed water averages 44 F. Temperature to be maintained is 160 F. Indications are, however, that this temperature was not attained as the heaters must have operated almost continuously during July and August and early September, when the boiler was shut down, to have consumed the number of kilowatt-hours indicated. However, the temperature was sufficiently high to produce satisfaction.

That satisfaction resulted in the complete electrification of the kitchen which, prior to the change, used a wood and coal range for cooking and dishwashing. Now, new electric tanks have taken over the hot water requirements of the kitchen.

Carlton Le Fehr Wheater

Lawton Clark Jones Lundberg

SW Section Inspectors End Isolation

Independent as ever the Southwestern Section, International Assn. of Electrical Inspectors, broke with its own traditions of isolation when it held its independent interim business meeting and conference at the Mar Monte in Santa Barbara, July 20-22. A surprising attendance of 101 men, the large majority of them active inspectors, and 44 wives met there independently of this year's joint convention of all five national sections that is to be in Chicago Sept. 21-26 to celebrate the 25th anniversary of the founding of IAEI.

Last year it had been feared not many would go to Chicago from California, so this interim meeting was voted. Favored with a strong delegation from Arizona and Nevada and eloquent appeals by many that these states, which are also in the Southwestern Section, be given due consideration for future annual meetings, the meeting voted finally that next year's will be at Elko, Nev. There is a strong possibility that the Northwestern Section will be invited to meet there too in a joint session.

Other than this and the customary vigorous proposed code change "rassle" it was a Herb G. Ufer retirement and accolade occasion. This popular and energetic secretary-treasurer of the section, to retire in November as Western superintendent of Underwriters' Laboratories Inc., has served as secretary since 1947 and before that for many years as secretary of the Southern California Chapter. He has tried to give up the section secretaryship for the past three years but the group would not hear of it. But this time he made it stick. At the dinner, July 21, he and Mrs. Ufer were presented with a set of luggage and a memory book signed by all.

Then at the election of officers L. E. Le Fehr, Alhambra city electrical inspector, who finishes his year as president of the section, agreed to take on the secretary-treasurership when he turns over the gavel to E. E. Carlton, supervising electrical engineer for the California State Division of Industrial Safety. Ben H. Wheater, Long Beach inspector, becomes first vice-president; James Ambrosi, Oakland inspector, is the new second vice-president.

In a president's address that broke all records for brevity Le Fehr said, "This section must recognize its responsibility to all its chapters and all of its area. Our Nevada and Arizona Chapters are active chapters. Let's give them all the consideration that we would give to the California chapters." Of the situation that has discouraged the holding of meetings out of the state he said, "There are among you some members whose city or county government will not permit you to attend a meeting out of state. Something *can* be done about that. Those who are restricted can surely use a part of their vacation time to attend such a meeting."

Charles L. Smith, secretary-treasurer of the IAEI, Chicago, attended and told of the plans and program for the Jubilee meeting. He said that already 1,500 advance registrations had been received and that perhaps 2,000 would attend from all over the continent. He also promised that copies of the new 1953 edition of the National Electrical Code, which he had just sent to press, would be distributed at that time.

As always, even before a new code is out the inspectors have many ideas for changes to improve the succeeding one. This time there were 57 changes proposed and as usual also the three-day session was insufficient to cover them all. Larry Trim, Burbank city inspector; L. E. Woldit, Sacramento city inspector; Ray T. Colby, Fresno city inspector; and Harold Gerber, former San Francisco inspector and now a consulting electrical engineer, conducted the code change discussion sessions.

Among the most significant code changes desired were: to require a main switch or disconnect ahead of each set of service conductors where there are six or more single-pole breakers because in case of switch fires there is no way to isolate the service wires; markers be required on groups of fixtures to show where wires feed in; grounding of metal frames of *all* portable, stationary or heating appliances; standardization of plugs and receptacles so that plugs of higher or lower rating cannot be used in receptacles other than those for which they are approved; better thermal disconnecting means for motors to stop them when heated from other than electrical causes; that low voltage control

NECA and IBEW entertained IAEI at the Santa Barbara social hour. Among the principals were: Bob Murphy, contractor; Will Pregill, NECA manager; Harry Dobson, inspector host; Charles Smith, IAEI, Chicago; L. E. Le Fehr, SW Section president; James Hurley, contractor; H. G. Ufer, SW Section secretary-treasurer; and Dave Milne, IBEW business manager there

wiring be required done according to wiring methods in Chapter 3 and to require insulation of 600 v. A committee on Article 500, on hazardous locations, headed by Tom Hughes, tried without much success to get rid of complications and restrictions that in their experience are either unenforceable or unnecessarily severe for the hazards involved. A resolution to demand labeled meter sockets passed.

The report on electrical fires, made by host Harry V. Dobson, Santa Barbara city inspector, again pointed to overheated motors as the most frequent cause of fires. He also quoted from a study made by Lloyd G. Gates, Los Angeles Dept. of Water & Power, of motor fires. In it Gates concluded that poor housekeeping and lack of protective equipment were chiefly to blame. It was because of these that it was later voted to require built-in protection, not only for electrical overload but for overheating from other sources as well.

Reporting on electrical accidents in business and industry, Carlton said it is 25 times more dangerous to be hurt electrically than from any other cause, as he gave the Division of Industrial Safety figures for the past year. He also described the new methods of tabulation by which the causes can be more accurately determined.

A. B. Smedley, consulting engineer, told the inspectors of the formation of an industrial users committee to gather data on wire and cable performance as an aid to reconciling the differences in the wire tables in the California Electrical Safety Orders and the National Electrical Code. (See ELECTRICAL WEST, July 1953, p 104.)

Only technical speaker on the program was Ed Dibble, General Electric Co., Los Angeles, who described the advantages of the new 480/277-v distribution system for wiring of large buildings and plants and how it could be used for the lighting system, employing low voltage relay switching.

Proposed legislation in California to examine and license all inspectors, building, plumbing and electrical, was discussed and a committee appointed to study it and report next year. Woldit of Sacramento was named by Le Fehr to be its chairman.

Two code breakfasts, starting at 7:30 a.m., had attendance of about 75 each and lively discussion on these topics: diversity factors and wiring requirements for installing built-in electric range ovens and separate surface units; slimline fixture ratings and demands; badly designed dry cleaning equipment where controls were concealed by pipes; use of service station light standards as raceways; overloading of temporary service assemblies for construction by some contractors who place as heavy as 5-hp motors on them.

With copies of 10 diagrams showing methods of grounding service equipment now accepted by all but two cities in southern California, Wheater submitted them item by item to the entire group and asked for any change anyone desired made. This was done to eliminate all differences so that these may be universally acceptable in the entire section area. Revised sheets will soon be issued.

How each of the Nevada and Arizona Chapters were formed and what they have done was reported. J. Hyde Stayner, Utah Power & Light Co., past president of the Northwestern Section, and M. E. Lundberg, manager of Elko Lamoille Power Co., told of the Nevada Chapter formation and paid high tribute to H. G. Ufer. Frank C. Jones, Arizona Fire Rating Bureau, did the same for the Arizona Chapter. Both invited the Section to hold future section meetings in their states in rotation with those in northern and southern California. Later the section voted for such rotation. The committee to select the next meeting place recommended Sacramento for the 1954 annual meeting but the group voted in favor of Elko instead.

Besides the officers already noted the executive committee elected consists of M. E. Lundberg, Nevada; E. V. Muller; John T. Carey, Hawaii; Frank C. Jones, Arizona; L. E. Woldit, Sacramento; H. K. Winterer, associate. Ufer was re-elected to the executive council and R. D. Johansen elected to it also. R. B. Maxwell and A. C. Veit have a year to go. A vote was unanimous to recommend Ufer to honorary membership in IAEI at the time of his retirement.

Leon Guibara, U. S. Rubber Co., was jovial master of ceremonies at the dinner dance and W. A. Cyr, ELECTRICAL WEST, presented a skit on TV antennas and low roof service periscopes.

High praise for a smooth running convention was paid to H. V. Dobson, chairman of the convention committee, and his assistants, Robert C. Murphy, contractor; Will Pregill, NECA manager; Charles F. Mullenbach, for the manufacturers' exhibits; Ray Emery and A. R. Christensen, Santa Barbara inspectors; Dave Milne, IBEW Local 413; Clinton W. Smith, transportation; Adam Huggins, reception, and Perry G. Martinson, golf. Mrs. Dobson arranged the ladies entertainment.

PANORAMA OF THE PCEA

Chairmen Ready for New Year

Appointment of committee chairmen and members continues in all sections of the PCEA as the association gets set for its new year of work. To date, appointments are as follows:

Business Development Section

Guidance committee chairman is Walter F. Chapman, San Diego Gas & Electric Co.; vice-chairman, J. A. Corlett, General Electric Co., San Francisco. There are 15 members of the guidance committee, three of whom are members at large. Each of the other 12 is chairman of one of the section's committees.

Members at large are: J. H. Adams, Southern California Edison Co.; Jack Kiedaisch, Arizona Public Service Co., Phoenix; and F. E. Bodine, Westinghouse Electric Corp., San Francisco.

Other guidance committee members are: D. S. Aiken, PG and E, San Jose, chairman, home lighting committee; E. G. Stahl, PG and E, San Francisco, chairman, 4-H Club electric project committee; R. J. Crump, UCLA, chairman, school lighting committee; Mrs. Marjorie C. Helm, California Electric Power Co., Riverside, chairman, home economics committee; R. W. Dowd, California Electric Power, Riverside, sponsor, residential adequate wiring group; W. P. Frost, Westinghouse Electric Supply Co., Los Angeles, sponsor, television group; Jess C. Porter, General Electric Co., San Francisco, sponsor, agricultural load building group; E. W. Meise, San Diego Gas & Electric, sponsor, kitchen and laundry group; R. E. Johnson, General Electric, Los Angeles, sponsor, commercial - industrial group; Louis Wallenberger, Coast Counties Gas & Electric Co., Santa Cruz, sponsor, commercial - industrial lighting; C. J. Bunce, Bureau of Home Appliances, San Diego, sponsor, commercial - industrial wiring; D. V. Doub, General Electric, San Francisco, sponsor, commercial - industrial power.

Vice-chairmen of the Business Development Section committees so far appointed are: Al Reitman, General Electric Co., Lamp Division, Los Angeles, home lighting committee; J. E. Barnes, PG and E, San Rafael, school lighting committee; Christine Dent, Westinghouse Electric, San Francisco, home economics committee; George Sullivan, Southern California Edison, Los Angeles, co-sponsor, agricultural load building group; Harper Dowell, Philco Corp., San Francisco, co-sponsor, television group.

Engineering and Operating Section

Guidance committee chairman is J. A. Longley, Allis-Chalmers Mfg. Co., San Francisco; vice-chairman, W. T. Johnson, California Electric Power, Riverside; C. W. Eddy, California Electric Power, chairman, accident prevention committee; T. A. Phillips, Arizona Public Service, sponsor, communications group; W. J. Lindstrom, California Electric Power, sponsor, engineering design group; A. C. Werden, Southern California Edison, sponsor, hydro generation group; A. D. Irion, Southern California Edison, sponsor, meter group; E. R. Davidson, Coast Counties Gas & Electric, sponsor, overhead transmission and distribution group; A. K. Ingraham, PG and E, sponsor, steam generation group; R. H. Middleton, San Diego Gas & Electric, sponsor, transportation group; I. W. Collins, PG and E, sponsor, system operations group; R. C. Blankenburg, Southern California Edison, sponsor, underground transmission and distribution group; W. L. Moats, Westinghouse Electric, sponsor, substation group; Walter D. Skinner, PG and E, Frank W. Gaiennie, Sierra Pacific Power Co., Whitman Ridgway, General Electric, and Charles Croft, Square D Co., members-at-large.

General Committees

Highway lighting committee chairman is H. F. Hartzell, Maydwell & Hartzell Inc., San Francisco; members are O. R. Doerr, PG and E, San Francisco, H. G. Dillin, San Diego Gas & Electric, G. N. Hawley, Edison.

Technical subcommittee chairman is G. A. Trosper, PG and E, San Francisco; members, G. S. Kimball, San Diego Gas & Electric, J. E. Hammond, PG and E, Fresno, W. H. Ritter, California Electric, Riverside, R. E. Dahlin, Southern California Edison, K. M. Koch, General Electric, San Francisco, L. W. Luley, Westinghouse Electric, Los Angeles, L. W. Towner, General Electric, Los Angeles, Bruce Kunde, Line Material Co., Los Angeles, J. H. Burson, Westinghouse Electric, San Francisco, and Milo Cain, Coast Counties Gas & Electric.

Chairman for the **code and ordinance** committee is F. E. Strauss, General Electric, Oakland. Vice-chairman is L. E. Shelley, Federal Electric Products Co., Los Angeles.

Advertising and publicity committee is headed by W. O. Kyte, General Electric, Los Angeles. Vice-chairman is A. J. McCollum, PG and E, San Francisco.

Membership committee chairman is Marshall Lasher, Hubbard & Co., Emeryville; vice-chairman, E. H. Galchutt, Graybar Electric Co., Los Angeles.

D. D. Smalley, PG and E, San Francisco, is chairman of the **budget and finance** committee with R. N. Dreiman, Coast Counties Gas & Electric, San Francisco, W. J. Maytham, Westinghouse Electric, San Francisco, Harold Quinton, Southern California Edison, Los Angeles, J. F. Pollard, PCEA treasurer, PG and E, San Francisco, and Victor W. Hartley, PCEA managing director, Los Angeles, as members.

Resolutions committee is headed by George C. Tenney, McGraw-Hill Publishing Co., San Francisco.

R. J. Crump, UCLA, is chairman of the **school lighting** committee; vice-chairman, J. E. Barnes, PG and E, San Rafael. Members are H. F. Hall, Southern California Edison, Los Angeles, Charles Gibson, state department of education, Glenn Balch, American Institute of Architects, Los Angeles, Byron M. Thompson, superintendent of schools, El Monte, George S. Erskine, consulting engineer, Menlo Park, Carl Koch, consulting engineer, Sacramento, Foster Sampson, consulting engineer, Los Angeles, Paul Schmidt, consulting engineer, Oakland, and Ralph B. Priestley, American Institute of Architects, San Francisco.

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Kaiser Aluminum & Chemical Corp.
Kansas City Power & Light Co.
Kingdom of Greece
Los Angeles Department of Water & Power
The Mead Corporation
Monsanto Chemical Co.
National Advisory Committee for Aeronautics
National Aniline Div., Allied Chemical & Dye Corp.
New England Electrical System
New York State Electric & Gas Corp.
Niagara-Mohawk Power Corp.
Pacific Gas & Electric Co.
Packard Motor Car Co.
Pennsylvania Electric Co.
Philadelphia Electric Co.
Pittsburgh Plate Glass Co.
Republic Steel Corp.
Reynolds Metals Co., Inc.
Southern California Edison Co.
United States Army—Corps of Engineers
United States Bureau of Reclamation
United States Navy
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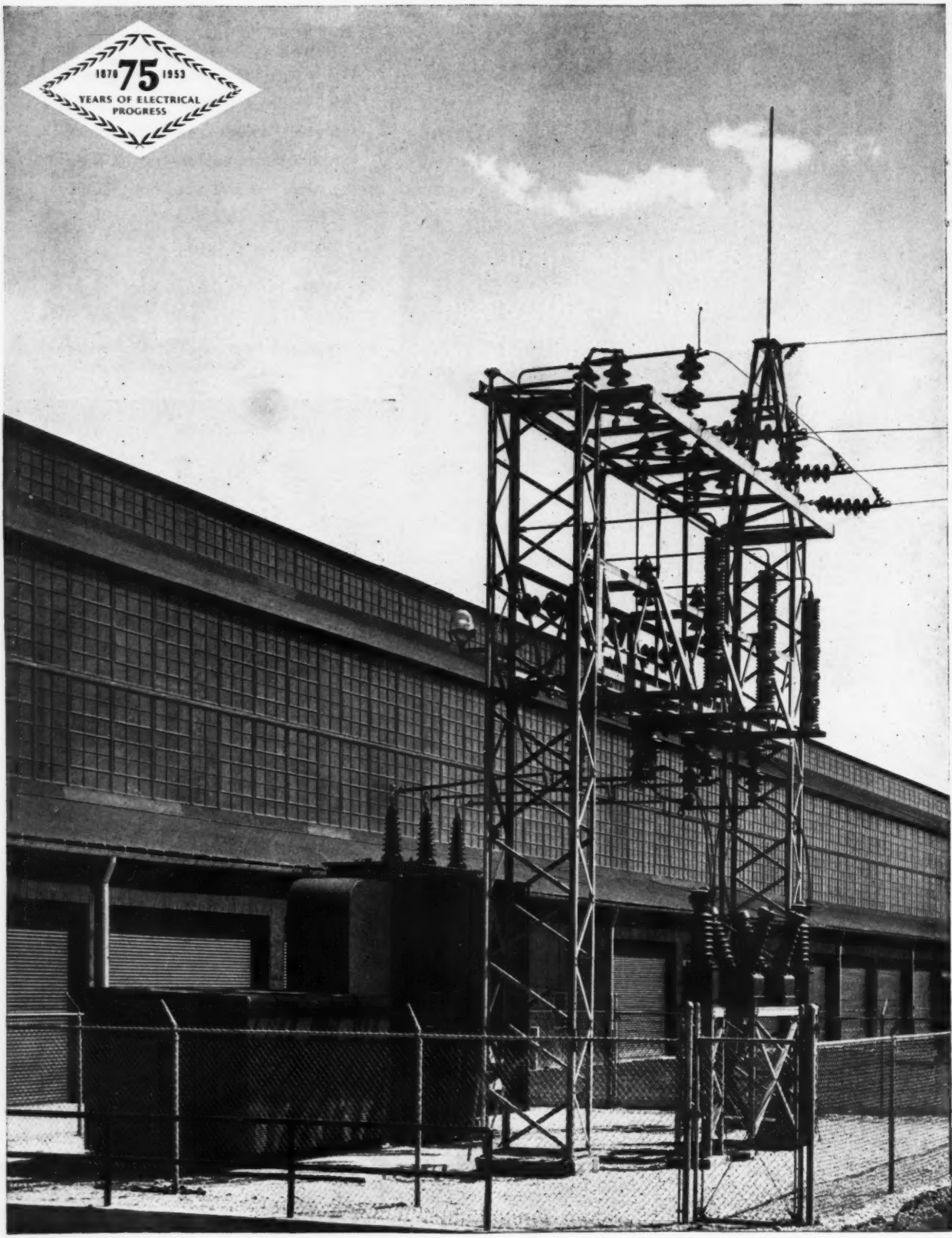
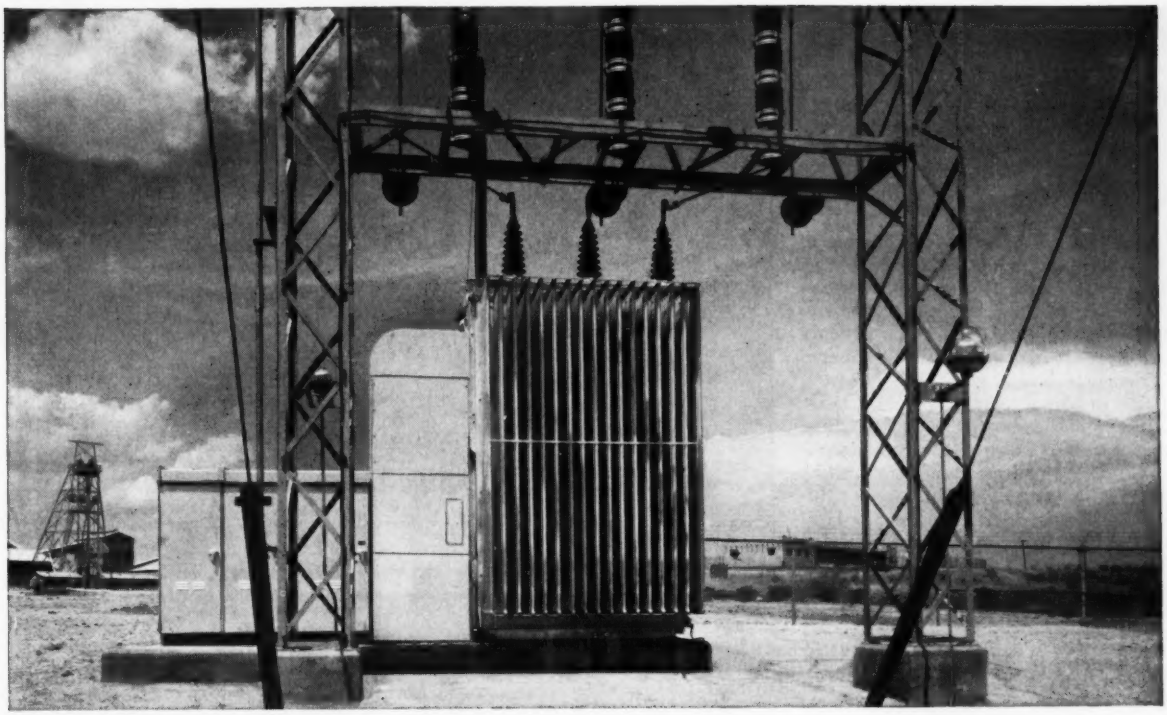


INDUSTRIAL INSTALLATION of G-E substation will take care of power needs of the Aviation Division of The Bingham-Herbrand Corporation, Fremont, Ohio. Many utilities recommend industrials install package substations at service entrances.



5000-KVA PACKAGE SUBSTATION is often best size for industrials. Southwestern Public Service Co. installed "building-block" unit at entrance of Duval Sulphur & Potash Co., Carlsbad, New Mexico—saved investment in unused capacity.

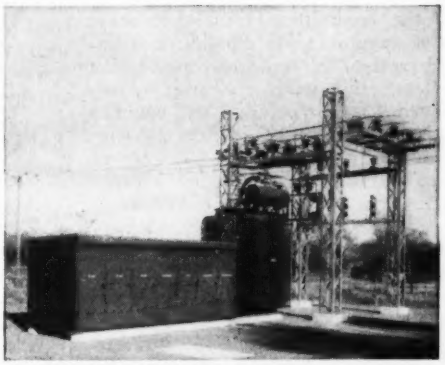
G-E package substations give utilities low-cost answer to fast-growing loads

Unit installations keep pace with greater industrial power demands

Installing new power service entrances for industrial sites—or revamping old service entrances—can become a simple, easily handled job for utilities. Whether one industrial plant or five is involved, General Electric's economical package and master unit substations can help solve problems of rapidly increasing load density.

Small package substations take care of individual plant requirements in isolated sections, and can be added to existing service installations in areas of concentrated industry. Either way, utilities can keep units economically small—only large enough to meet expected load growth—and they can avoid heavy investment in large substations with unused capacity.

Package substations reduce costs, give flexibility for shifting loads, save installation time by using co-ordinated components. For details, write for GEA-4500, "Package Substations," General Electric Company, Schenectady 5, N. Y. 882-1



IN EXPANDING INDUSTRIAL AREA, centrally located small substation of Niagara Mohawk Power Co. assures sound distribution investment.

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Quick Pickup

Thanks to their instructor, Earl Peak Jr. (second from right), for completing the NECA estimating course of the San Francisco Electrical Contractors Assn. was expressed in an engraved scroll and a watch by the class, represented by committeemen Charles Gray, Maurice Laning (making presentation) and James Delos, estimators taking course

NECA

Publication of a revised edition of a uniform electrical code for the East Bay cities and counties in the San Francisco Bay region is a successful result of more than three years of work on the part of a committee composed of various branches of the industry. Prior to three years ago electrical inspectors had been meeting in an effort to arrive upon satisfactory standards for the various East Bay communities. Because of differences of interests involved, it was decided to form a Uniform Code Committee for the region and Ernest G. Kramm, manager, Northern California Chapter, NECA, Oakland, was asked to serve as chairman.

On the committee are representatives of both the Alameda and Contra Costa County branches of NECA, various electrical inspectors from the two counties and major cities, a representative each from the IBEW locals in Oakland and Richmond, one from PG and E, one from the sign companies and one from PCEA.

In January 1952 a first edition of a code was issued and on Feb. 10, 1953, a revised edition was agreed upon. This code has been adopted in the cities of Berkeley, El Cerrito, Albany and Alameda, and Alameda County and the city of San Leandro are expected to adopt the revised code soon.

A uniform schedule of electrical permits and fees has also been developed by the committee. This is to serve three purposes: (1) Provide a standard method for uniform computation of fees, which may be adopted by reference, (2) enable cities and counties to increase their fees in amounts consistent with increases in the cost of administration of inspection departments, and (3) remove inequities in existing schedules. The Uniform Electrical Code Committee also serves as a body for making uniform interpretation of code clauses that may be in question.

A committee from the San Francisco NECA Chapter visited recently to work for more uniformity between both sides of the bay.

How to sell the services of an electrical contractor in spite of competitive bidding is not often considered by a contractors' group. However, Northern California Chapter, National Electrical Contractors Assn., held a joint meeting of its three branches July 7 to hear Joseph A. Gilbert, director of sales training for Moore Business Forms Inc. and a teacher of salesmanship, analyze sales approaches to an electrical contracting business. The meeting was sponsored by the Business Promotion Committee of the chapter, which Robert Schwartz opened. Chester Brunnelle of Vallejo and Art Rogers of Richmond are the members. Schwartz outlined the chapter's direct-mail program of sending out copies of NECA national ads, together with a shortened letter directly addressed to 1,400 firms in the East Bay area. Response from the mailing had already been noted. Brunnelle outlined the adequate wiring progam in the area and how to get cooperation in certification of the homes from utility representatives. Victor Perero, president of the chapter, presided.

When Bert Demmon took over as president of East Central California Chapter, NECA, Bill Pollock became the chapter governor

IAEI

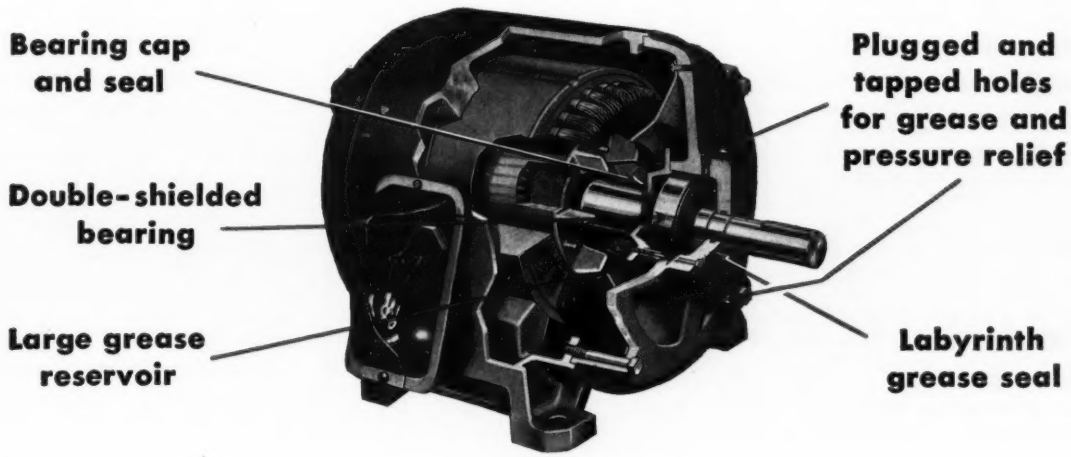
Rocky Mountain Chapter of International Association of Electrical Inspectors elected Howard Cummings, electrical engineer of the Bureau of Reclamation, Denver, as its chairman for the year at the annual meeting. A. P. Hall, Fort Morgan city electrical inspector, is vice-chairman and Meryl Mentzer, Rocky Mountain Electrical League, secretary-treasurer.

Puget Sound Chapter, IAEI, at both of its last two meetings objected to the proposed removal from the National Electrical Code of Table 30 because it has considerable use in the area, particularly in computing capacitor installations. Motions were made that code panels be asked to retain the table. A report on experience with connections to aluminum Tri-plex cable drops was given by L. R. Russell, engineer, Snohomish County PUD No. 1, and by Puget Sound Power & Light Co. representatives. Twin-barrel sleeve connectors have given no trouble but split-bolt connectors have given difficulty. Willard Duffy, Radiant Electric Glass Inc., at the June 6 meeting presented a comprehensive report on how the glass-panel heaters operate and are constructed. Desirability of having time lag features for all 15- and 30-amp plug fuses was expressed and it was asked that a special code committee on fusing recognize this demand. Next meeting will be in Bellingham Aug. 29.

Here Are Facts You Should Know About Electric Motor Bearings

An ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.


Bearing cap and seal
Double-shielded bearing
Large grease reservoir
Plugged and tapped holes for grease and pressure relief
Labyrinth grease seal

Which is the Best Design for *Your* Application?

But, we believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

The Allis-Chalmers standard design consists of a pre-lubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make re-lubrication desirable, it can be done as part of the normal lubricating-routine without dismantling the motor.

The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor. A-4130

ALLIS-CHALMERS A-C ALLIS-CHALMERS

EMEA

Northern California Electrical Maintenance Engineers Assn. elected Fred Gerick as its president, Lloyd Hall vice-president and Edward Price of Eitel-McCullough Co., San Bruno, its secretary. Directors elected were Roy Henning and Wallace Trout of Eitel-McCullough and L. E. Saville, chief engineer, 111 Sutter Bldg., San Francisco. The organization held a recess of meetings during the summer.

EMEA of Southern California brought its members up-to-date on industrial television and maintenance of industrial electronic apparatus when Wynn Stewart, sales engineer, Kierulff Electronics Inc. of Los Angeles, was the featured speaker July 15. Annual joint meeting with the Illuminating Engineering Society was held at the previous meeting in June. Carl Ladenberger, Southern California Edison Co., was appointed to the executive committee during the absence of Mike Boyak of Stetson Electric Co.

IAEL

As this goes to press, preparations are being made for the first conference of the International Association of Electrical Leagues ever to be held in the West, the 18th annual meeting of the organization, at Fairmont Hotel, San Francisco, from Aug. 4 to 8, inclusive. Full report of the meeting information will be given in the September issue. Ralph Hubbard, manager, Rocky Mountain Electrical League, is president of the association and Victor W. Hartley, managing director of PCEA, program chairman. LeRoy Bennett, Northern California Electric Bureau manager, heads the host arrangements committee.

RMEL

Preliminary program announcement for the Rocky Mountain Electrical League 50th annual fall convention, which this year will be held at Broadmoor Hotel Sept. 20-23, Colorado Springs, announces the entertainment features planned for this golden anniversary meeting.

Leagues

Sacramento Valley Electric League honored six of its past presidents for their service to the electrical industry in Sacramento at the June meeting. James H. Quinn, member of the State Board of Equalization, and R. R. Gregory, supervising auditor, were speakers, discussing sales tax matters and legislation passed by the 1953 legislature on tax.

Past President Bill Wheeler of NISA, 1937-38, of New York, and Bill Hogue, Larsen-Hogue Co., Los Angeles, new president-elect

NISA

With William Hogue, Larsen-Hogue Electric Co., Los Angeles, as the new national president of National Industrial Service Assn., the motor shop organization, some of the chapters in the West have recently held elections too. San Diego Chapter new officers include Ballard C. Beekmann, California Electric Works, president; Ted Cluts, Tri-Electricians, El Cajon, vice-president; Oliver E. Seeman, Ets-Hokin & Galvan, secretary-treasurer.

Oregon Chapter also has new officers. V. J. Hunt, Walker Electric Works, is president; Victor E. Weber, R. R. Poppleton Inc., vice-president; J. W. Morgan, C. E. Riggs Inc., secretary.

When former President R. A. Scherer visited the West Coast earlier this year, the Puget Sound and British Columbia Chapters held a joint meeting in Seattle. At the time it was hoped to hold joint meetings twice annually in the future.

Electric Clubs

Electric Club of Los Angeles named R. G. Kenyon, vice-president of Southern California Edison Co., as its new president, succeeding Ivan L. Bateman, chief electrical engineer, Los Angeles Department of Water & Power. Others elected for the year beginning in September until next June are: R. E. Johnson, General Electric Co. Industrial Division manager, first vice-president; Carlisle Bailey, executive vice-president, Newbery Electric Corp., second vice-president; Stanley M. Johns, Westinghouse Electric Corp. manager, third vice-president; Lawrence G. Maechtlen, vice-president, Square D Co., secretary-treasurer; George Larsen, vice-president, Larsen-Hogue Electric Co., sergeant-at-arms; and executive committee members will be Bateman, E. Dale Barcus, Louis R. Grime, Karl G. Kempf and Louis E. Starkweather. Before closing for the summer vacation Peter E. Mitchell, commissioner, Public Utilities Commission of California, was one of the speakers at a June meeting and at a previous meeting C. W. Schweers, now vice-president and director of sales of Allis-Chalmers Mfg. Co. General Machinery Division, and formerly of Los Angeles, addressed the group.

East Bay Electric Club in Oakland elected T. O. Gerlishe, consulting engineer, as its president to close the past year. He succeeded William V. Brainard of Cannon Electric Co. Others elected were Mark Wilkins, vice-president; Scott Beamer, secretary-treasurer; and directors are Frank Rothganger, Robert Griffin, Gray Minor, Frank Gadsby and William Boyd. The last meeting of the year was held jointly with the San Francisco Electric Club, an annual custom.

Electric Club of San Diego presented the Westinghouse color film *Energy is Our Business* at the June 1 meeting, presided over by Ronald Strong. Marvin E. Musgrave, San Diego Gas & Electric Co. personnel department, is its president; William J. Myers, first vice-president; Ernest B. Kipp, second vice-president; and Carleton J. Bunce, secretary-treasurer.

C. D. Casey, head of the Casey Electric Co. of Seattle, has been elected president of the Electric Club of Washington, a state-wide organization of men of the industry. A former first vice-president, membership and program chairman of the club, he succeeds John Nelson, assistant superintendent of Seattle City Light. Nelson served during the 1952-53 club year.

L. C. McIver, director of purchasing of the Puget Sound Power & Light Co., a former second vice-president, and program chairman, was elected first vice-president; O. B. Hubenthal, district manager of the General Electric Supply Co., was named second vice-president and R. A. Church, treasurer of the club for several years past, was re-elected. The secretary of the club is J. D. Gawne of City Light. He is appointed by the president.

Trustees elected to serve with the new executive officers include: Roy Kistler, Pacific Tel. & Tel.; A. H. Leader, Anaconda Wire & Cable Co., and R. L. Lemman of the Line Material Co. Lemman was elected for the two-year term. Also serving as trustees are Howard Bayley of the Industrial Electric Co., Seattle, a holdover, and Past President John Nelson, ex-officio member.

High in Profit... low-cost electrical radiant heating

U.S. Rubber's USKON® ceiling panels put you in the heating business

What does USKON mean to the Electrical Contractor?

FIRST, it can be quickly and easily installed—the panels *now* can be applied in sheet form to existing ceilings. No extensive wiring or alterations needed. A minimum of trouble and time for you. It keeps your costs down.

SECOND, Uskon is a proven seller. With Uskon the homeowner knows he can heat his house as it grows; when he wants to finish expansion attic, he merely orders some more Uskon panels from you. This is truly the heating system that fits everybody's needs and offers you repeat business.

THIRD, Uskon is a product of United States Rubber Company. It has been tried and proved for several years with complete success in homes, apartments, offices, expansion attics, commercial and industrial buildings, bathrooms, sun porches, game rooms, garages, basements, motels, summer cottages. Uskon has revolutionized electrical radiant heating!

Everybody wants USKON electrical radiant heating! Architects like the freedom of design it gives them—no radiators, furnaces, pipes, ducts, and so on. Decorators like Uskon for the same reason, plus the fact that it can be painted over with any ordinary flat paint.

Home Owners prefer Uskon because it costs less to install than almost any other kind of heating—and because it gives quick heat with a switch or thermostat. Uskon can be installed in one room or in all rooms; completely eliminates every kind of nuisance found in ordinary heating systems. Approved by Underwriters' Laboratories, Inc.

As an electrical contractor, you will find Uskon electrical radiant heating to be one of your most profitable items. It is made by United States Rubber Company, a great name known for quality products everywhere—a name that helps you sell. For complete technical data and cost information write for Catalog M3177, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

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THE MONTH IN BRIEF

Merger Agreement Extended

As the July 30 deadline on the WWP-Puget Sound merger was reached, PSP&L President Frank McLaughlin announced that the termination date on the agreement had been extended to Nov. 19. Closing date of the PUD purchase agreement was advanced from July 31 to Nov. 20, with the understanding that if a merger is effected earlier the district purchase agreement will be terminated. Merger hearings continued before the PUC late in July (see p 144).

Colorado Valuations Reduced

Protests by Colorado utilities won them reductions from increased valuations ordered against them this year by the state tax commission. The 1953 valuations of major Colorado utilities were slashed more than $11,000,000 after 23 utilities protested. The original assessment announced in June was $318,030,750. This was cut to $306,818,830, but the new total is still $13,-831,530 higher than the 1952 utility assessment. It was charged the original 1953 total resulted from improper classification of securities.

UP&L Building New Steam Plants

Utah Power & Light Co. will spend $26,500,000 on two new steam-electric plants and will step up their construction to take care of continuing load growth in the Intermountain area. A 100,000-kw extension of the new Gadsby station will be completed in mid-1955 instead of late 1956 as originally planned. The 66,000-kw Carbon County plant, to be located at Castle Gate, will be ready for service late in 1954, according to George M. Gadsby, president. (See p 136.)

Hells Canyon Hearings Proceed

Hearings on Idaho Power Co.'s application for license for its Snake River development continued in Washington, D. C., as this issue went to press. C. Girard Davidson, former assistant secretary of the Interior, representing the National Hells Canyon Assn., tried for a 90-day continuance of the proceedings on grounds that opponents were not adequately prepared on technical aspects of the three-dam plan. Refused, he tried unsuccessfully a second time, with the argument that FPC had failed to set rules in ordering the hearing and that Idaho Power should set out its applications in greater detail. As an alternative, Davidson asked the commission to summarily deny the Idaho Power applications, a motion that was also denied by William J. Costello, FPC examiner. (See p 130.)

New Law Affects Utility Districts

A bill signed into law by California's Gov. Earl Warren will increase from $1,000 to $3,000 the amount of construction work that may be done by a public utility district with its own personnel. It also steps up from $500 to $2,000 the purchases that may be made without advertising for bids. The new law becomes effective Sept. 9.

Utilities Board Named at Tacoma

A five-member public utilities board was appointed to supervise Tacoma City Light and other municipal utilities under a new city charter. The men named by Mayor Tollefson and confirmed by the city council were: Gerrit VanderEnde, president of Pacific First Federal Savings & Loan Assn.; Tom Anderson, co-founder of the Concrete Engineering Co.; Joseph L. Long Jr., executive of the Atlas Foundry Co.; C. Morrison Johnson, president of Washington Steel Products Co., and Ralph Johnstone, owner, Tacoma Feed Co. Long resigned when he discovered a proviso in the new charter that would prevent his firm from doing business with the city while he served on the board. (See p 132.)

Court Action Brought on Surcharge

Three "class suits" have been filed in Oregon to recover surcharges assessed by private utilities to help pay for steam generation costs during last winter's hydro shortage. Two actions brought in Multnomah County ask $1,399,738 from Pacific Power & Light Co. and $2,694,432 from Portland General Electric Co., plus costs and 15% attorney's fees. The third, filed in Lane County, asks $580,000 plus 20% for attorney's fees from Mountain States Power Co. The suits, brought by one corporation and eight individuals, claim that the surcharges were not legal because the PUC neglected to file a formal order; because the companies did not file revised and definite rate schedules for tariffs and did not ask emergency hearings. The Oregon PUC meanwhile prepared to resume hearings on the complaint of State Representative Monroe Sweetland and others that surcharges were collected illegally.

Interconnection Feasible, FPC Says

Proposed 230-kv interconnection between utility systems in northern California and the Northwest Power Pool was declared economically feasible in a report released by the Federal Power Commission. Study was made by the FPC staff at San Francisco at the request of the Defense Electric Power Administration. Cooperating with the FPC staff were Pacific Gas and Electric Co., California Oregon Power Co., Bonneville and USBR. Utilization in California of surplus Columbia River hydro during high stream flow period and firming secondary hydro energy in the Northwest by that available at times from steam-electric plants in California were among the benefits listed. Two possible interconnections were studied: (1) a line connecting the BPA system at Klamath Falls with either PG and E's Pit-Shasta system or the federal 230-kv system at Shasta, (2) a tie between the BPA system at Roseburg and PG and E's Shasta substation with a loop into USBR's Shasta plant.

Special Memo to Utility Sales Staffs!

Plan NOW to enter the competitions for the George A. Hughes Awards of 1953

The sales idea or promotional plan that brought unusual success in solving a major appliance merchandising problem in your area can be an award winner in the 1953 George A. Hughes Award Competitions. Why not give it a chance to win recognition for you or your company. Prizes will be awarded this year in the following fields of activity:

- **Electric Range Promotion**
- **Electric Water Heater Promotion**
- **Commercial Electric Cooking Promotion**

The George A. Hughes Awards for 1953 will be based strictly on productive sales ideas. Your company's size or existing conditions will have no bearing on award decisions. Separate prizes will be awarded in the listed fields of activities, and separate prizes will be awarded to companies of under 250,000 meters and to companies of over 250,000 meters.

The 1953 Hughes Award brochures are being mailed to operating electric utility companies and complete details are contained therein. If you need more information, write to Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y. Plan now to enter one or more competitions.

Hotpoint took pride in extending recognition to these outstanding utility companies and their employees who were the winners of the George A. Hughes Awards for 1952:

Utility Companies With Over 150,000 Meters

Southern California Edison Co., Los Angeles, Calif.
• Electric Kitchen Promotion

Ohio Power Company, Canton, Ohio
• Electric Range Activity

Pennsylvania Power & Light Co., Allentown, Pa.
• Electric Water Heater Activity

Philadelphia Electric Co., Philadelphia, Pa.
• Electric Dishwasher Activity

Appalachian Electric Power Co., Roanoke, Va.
• Commercial Electric Cooking Activity

Utility Companies With Under 150,000 Meters

Minnesota Power & Light Co., Duluth, Minn.
• Electric Range Activity

Central Ohio Light & Power Co., Findlay, Ohio
• Electric Water Heater Activity

Kentucky & West Virginia Power, Inc., Ashland, Ky.
• Commercial Electric Cooking Activity

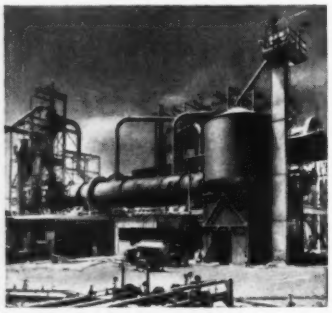
Hotpoint

(A Division of General Electric Company) • • •

what's NEW in Engineering

The shortage of engineers in all fields, according to three leading universities, will continue until 1955 or 1956. Then, a more balanced supply and demand picture should emerge—thanks to heavy registration of engineering students in the past two years. Meanwhile, one major university reports that in June they had over 4,000 jobs on file—open to 260 graduates.

Microscopic sea plants, called diatomaceae, are getting a lot of attention at Lompoc, California. Deposited geologic ages ago on the floor of what was then an island sea, their fossils are highly valued in many industries for filtering, refining, and other processes. To utilize



the huge deposits at Lompoc, Kaiser Engineers recently designed and built one of the largest and most modern Dicalite plants in the nation for Great Lakes Carbon Corp. We'll send you a reprint of an article in *Industrial and Engineering Chemistry* which tells the story of Lompoc's diatoms.

Chi-Teh Wang, N. Y. U. aeronautical engineering professor, has written a book on a new approach to elasticity. To be published by McGraw-Hill in August, *Applied Elasticity* presents useful analytical and numerical methods of applying fundamental elasticity theories.

Did you know that Kaiser Engineers is noted for widely diversified engineering talents? Departments include civil, structural, electrical, mechanical, architectural, process and production, mining and geology, metallurgical and chemical—all prepared to work closely together on any project. When you have a problem in engineering, call or write Kaiser Engineers Division of Henry J. Kaiser Company, Kaiser Building, Oakland 12, Calif.

THIS MONTH'S NEWS

Hells Canyon Safeguards Recommended by McKay

Recommended to the Federal Power Commission by Interior Secretary McKay at commission request were these stipulations to safeguard public interest and insure coordination of Idaho Power's proposed Hells Canyon development with the over-all Columbia River basin plan:

To provide—

1. For the salvage of archeological values through some qualified institution. The Smithsonian Institute has surveyed the area and estimated the salvage cost at $12,000 which it is recommended be paid by the license applicant.

2. Protection for present and future upstream consumptive uses of water. Idaho Power Co. has already recognized this principle in its application to the State of Idaho for a right to appropriate Snake River water for the three power plants and the stipulation would simply be a means of assuring that the principle is carried out in safeguarding future upstream depletion for irrigation development.

3. For operation coordination and interconnection with the Northwest Power Pool.

4. For completion of all three projects within a specified and reasonable period of time which is related to the critical need for power in the Pacific Northwest.

5. That the licensee shall make available to the Secretary of the Interior $250,000 for use by the Fish and Wildlife Service to carry out detailed studies of the extent and character of the fishery resource of the project areas and to devise means and measures for mitigating losses to that resource prior to the initiation of construction.

6. That the licensee shall construct such facilities, purchase such lands and make such modification in operational plans in the interest of preservation of fish and wildlife resources in connection with the projects as may be subsequently prescribed by the commission on recommendation of the Secretary of the Interior.

7. That the licensee shall pay for the operation and maintenance of the facilities incorporated in the projects for the preservation of fish resources.

8. That the licensee shall maintain the reservoir areas open to free use by the public for hunting and fishing, except such portions as may be reserved by the licensee in the interest of safety, efficient operation or protection of the licensee's property.

9. That the licensee shall acquire island and marsh areas along the Snake River for development as substitutes for the waterfowl nesting areas to be lost by reservoir inundation.

Should a license be issued for Idaho Power Co. development, Secretary McKay said Interior will release from reclamation withdrawal any public lands now in that status that are needed for reservoir purposes.

Utility, Government Will Complete Line Jointly

Bonneville Power Administration and California Oregon Power Co. have worked out an agreement for joint completion of a 230-kv transmission line to deliver Columbia River power to southwest Oregon.

Approved by Interior Secretary McKay, the plan fulfills a BPA proposal partially constructed under Congressional authorization but for which completion funds were refused.

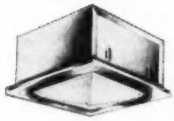
Terms of the agreement call for BPA to complete 10.9 miles of the Redwood-Klamath Falls 230-kv circuit from its present Chemult terminus to Yamsay station. Copco will acquire present cleared right-of-way south of Yamsay to Klamath Falls and build a substation at Klamath Falls. BPA materials already purchased for that section of line will be sold to Copco on a replacement basis.

Copco will also build a new transmission line from its Dixonville substation to a Nickel Mountain station to be erected by BPA to supply the M. A. Hanna's defense materials project in the mining region. Bonneville has allocated firm energy to Hanna from a block reserved for defense projects.

Schedules call for the Redmond-Klamath Falls line and the Klamath Falls substation to be ready in December 1953 and the Copco and BPA phases for Nickel Mountain by the summer of 1954.

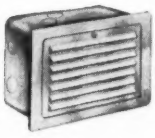
● **Plans** for a $200,000 man-lift at Diablo to start City Light crews on their route to the new Ross power house have been approved by the Seattle Board of Public Works.

DERBY DOWNLIGHTS—Endless applications. 7″ diameter recessing downlights, available with matt black removable louver or with Holophane Controlens*. UL approved.

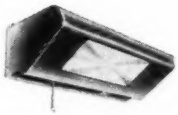


DUO-FRAME UNITS—Recessing units with Holophane, Corning, and Phoenix glassware. Two-piece frame. Drop hinges. Vertical and horizontal lamp mounting units. UL approved.

EXIT SIGNS—Surface, recessing, top and end mounting units. Metal stencil sign faces, backed by red glass. HOT-BONDED lustre aluminum finish. UL approved.

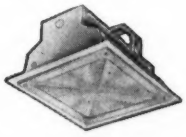


NITE LITE—One-piece, die-drawn recessing box. Louvered face with concealed hinge for easy servicing. Stainless steel or baked lustre aluminum finish. UL approved.



BED LAMP—Direct-indirect hospital unit. For three 50/60 watt lamps. Stainless steel finish. Controlens* panel in bottom, diffusing glass in top. UL approved.

PLEXOLINE® ACCENT UNITS—For use singly or with PLEXOLINE linear units. Adjustable and fixed units. Louvered body provides spill light on sides. UL approved.



TROFFER ACCENT UNITS—Self-contained square recessing units, adjustable or fixed, flange or snap-in type. May be used singly, within or at end of troffer runs. UL approved.

SURFACE MOUNTED ACCENT UNITS—Adjustable units or fixed units with Holophane Controlens*. May be used singly or with VIZ-AID® or LENOX® fixtures. UL approved.

RECESSING CORRIDOR UNITS—Available with two optical characteristics: asymmetric and symmetric. Flange or snap-in. Holophane* prismatic glass globe. UL approved.

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NEW UTILITIES BOARD ACTS AT TACOMA

The recently organized public utilities board at Tacoma, Wash., has retained C. A. Erdahl as acting director of utilities for the time being or at least "until the board is acquainted with all the ramifications of the problems." Erdahl had been the elective utilities commissioner until Tacoma began operating under a new municipal charter July 1.

In his first session with the board, Erdahl took issue with the view of Mayor Harold M. Tollefson that Tacoma nominees to the state power commission soon to be appointed by Gov. Arthur B. Langlie, as authorized by the 1953 state legislature, should not be "utilities executives."

Erdahl told the board he thought the nominees should be directly connected with Tacoma utilities and that someone not having to do with policy making on the commission might cause some argument as to the nature of Tacoma's policy.

The board's first directive to Erdahl was to provide a complete breakdown of all expenditures involved in the department's new headquarters, now under construction at a cost estimated at between $2,000,000 and $3,500,000. The board suggested that Erdahl provide figures for the time members of his staff have spent in planning the project and an estimate of maintenance costs.

Chairman Gerrit VanderEnde pointed out to Erdahl and other utilities officials that the board had been made responsible for policy making and declared that any matter of long-range objectives and policy should be referred to the board. He suggested that Erdahl furnish an organizational chart and any plans contemplated in the future.

Erdahl told the board that "there are some things where the department has authority," such as in the expenditure of $7,000,000 already approved for the balance of this year in utility projects. He argued any public statement concerning the utilities would have to come from the board.

Reporting on the proposed new contract between Tacoma City Light and the Bonneville Power Administration, Erdahl declared he was very much concerned that Secretary of the Interior Douglas McKay was "holding out" on the contract approval and expressed concern the government might try to alter the Tacoma contract. Bonneville appears to have sold more power under contract than it can deliver unless the government puts up more money for dams, said Erdahl.

The board agreed to recommend to the city council a City Light expenditure of $10,000 to hire a consultant for its generator installation at steam plant No. 2.

New Mexico Company Asks For Increased Rates

The New Mexico Public Service Commission has under consideration a request by Public Service Co. of New Mexico for increased electric power rates at Deming, Albuquerque, Santa Fe and Las Vegas.

The commission is not expected to rule until sometime in September though the utility hoped to have its new rates in effect by Sept. 1.

In its rate request and during the five-day hearing, the utility claimed a rate base of $32,696,751 as of May 31, 1953. It asked an approved earnings rate of 6.85%. President Arthur Prager said the firm needed more revenue to meet higher costs, including pay rolls, and to attract capital for expansion.

The company said it has $3,416,711 in new construction underway and plans to spend $7,000,000 in 1954.

It has had separate power rate schedules for each community, but proposes to integrate the system and charge uniform rates throughout. The effect will be that Albuquerque, with 80% of firm's customers, will take a big rate boost, Santa Fe a lesser boost, while Las Vegas commercial users get a substantial decrease and homeowners there only a slight increase.

District Can Assess for Underground Water

A bill granting California's Orange County Water District the authority to assess up to $5.50 per acre-ft for water extracted from underground has been signed into law by Gov. Earl Warren.

The law will become effective Sept. 9. It specifies the proceeds must be used to replenish the underground water supply.

The Irrigation Districts Association of California reported the results will be "watched with great interest for it involves a new departure in water law. Under the act those who pump will pay taxes to provide funds with which to purchase water for use in improving the underground basin."

The bill also repeals the Orange County Water District's authority to engage in flood control activity and increases the number of directors of the district from 7 to 10.

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Specially finished inside with a protective coating of resinous lacquer compounded with Zirconium, SPANGLEAM provides easier wire pulling, assured grounding and corrosion resistance.

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PUD TAX LIABILITY SUBJECT OF SUIT

The North Wasco PUD of The Dalles, Ore., plans a "friendly suit" against Wasco County to determine whether the PUD must pay county property taxes.

The legal action was prompted by the Wasco sheriff's listing of the PUD on the delinquent tax list for a total $17,819 taxes and $2,047 interest. The delinquency covers a three-year period. The PUD argues it is not required by state law to pay because of the established principle that public bodies are not taxed by other public bodies.

Decision to file suit followed a conference July 3 between Wasco County Court, the administrative board under Oregon code, and the PUD board. The PUD argued its attorney, Raymond Kell, Portland, had quoted an Oregon attorney general's opinion upholding its position, which the board said was the practice of the three other operating PUDs of Oregon.

When the suit is filed, Wasco District Attorney Donald Heisler plans to ask the Oregon Tax Commission to enter the case as an interested party. The commission is presently a defendant in another PUD suit seeking a reduction of the Wasco PUD's assessed valuation. PUD Board Chairman Cecil Byers said it is possible suit might be avoided if the PUD could prevail upon the Oregon Supreme Court to issue an advisory opinion. This is rarely obtainable, however, and there is no precedent for a tax question.

USBR to Study Irrigation Water Protection on CVP

The Bureau of Reclamation's new California projects office in Sacramento has begun engineering investigations preliminary to negotiations with Southern California Edison Co. on protection of Central Valley Project irrigation water in the event that FPC grants the firm a permit for the Mammoth Pool hydro project on the San Joaquin River.

The new bureau studies, being made in line with a directive from Secretary of Interior Douglas McKay's office, supersede an investigation of construction of the project as a federal government development.

Secretary McKay, in a letter to W. C. Mullendore, president of the Southern California Edison Co., said, "We are of the view that no license should issue" until a satisfactory agreement has been worked out. No date has been set for the negotiations between the bureau and the power company.

Southern Cal Edison had asked Secretary McKay to rescind former Interior Secretary Oscar Chapman's protest to the FPC to the private company's request for a permit to provide for a 125,000 kw development for the winter peaking of power. Chapman had maintained that under a federal plan 500,000 kw could be developed along with an additional 500,000 acre-ft of irrigation water.

Utility Builds Line to Serve Mine and Townsite

Arizona Public Service has started construction of a 21-mile power line to serve the San Manuel Copper Corp. mine and townsite, a complete new development at San Manuel, Ariz. The 115,000-v line will run from Oracle Junction to San Manuel with completion scheduled late in September at a cost of $350,000.

Vyne Bros. of Prescott is furnishing the labor with Arizona Public Service supplying material. The line will provide power for the mine and for the new townsite which will have approximately 7,000 people. The mining company is supplying its own power for preliminary mining operations until the line is built.

The Bureau of Reclamation will construct a switching station at Oracle Junction and, until that is finished, Public Service will tie directly to the bureau line.

● **Workmen** had to unload the 80-ton core of a 50,000-kva transformer in order to get it over a central Arizona irrigation canal. The complete transformer weighs 124 tons. It is the largest on the Arizona Public Service system and was installed to provide more power to new irrigation districts. The transformer was built in Switzerland and was sent by ship through the Panama Canal to Los Angeles, then by rail to central Arizona.

● **Ellensburg,** Wash., City Council has approved the sale of its power generation equipment to the Eastern Pressure Block Co. of New York City for $27,000. The equipment has not been used since the city entered into a power supply contract with BPA.

● **Clark County** PUD has rejected all bids it received several months ago for construction of an office building at Vancouver, Wash., and shortly will invite new proposals. The low bids totaled $444,000, considerably higher than had been estimated.

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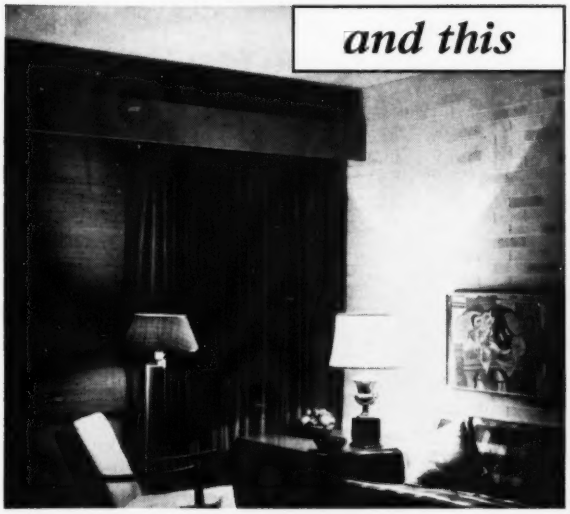

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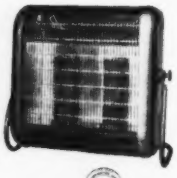

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IDAHO POWER WILL LEASE UTAH P&L STEAM PLANT

To tide it over until additional hydro capacity can be developed, Idaho Power Co. will lease a new steam unit to be installed by Utah Power & Light Co. Under terms of the lease the Utah company will advance the installation of unit 3 in its new Gadsby station by two years in order to make its 105,000 kw capacity available to the Idaho company.

The new unit will be operated jointly by the two utilities from June 1, 1955, to Oct. 1, 1958. Except for a new substation at the Gadsby plant in Salt Lake City, short transmission to Utah's Terminal substation and a 9,000-kva synchronous condenser at Goshen substation, power will be fed into the eastern portion of Idaho's system over existing facilities.

Important New Link In Coast Network

Important new link in the Pacific Coast interconnected transmission network is a 32.8 mile section of 220-kv line tying Herndon substation of Pacific Gas and Electric Co. with the Southern California Edison Big Creek-Long Beach transmission lines at a point near Academy, Calif. The line was placed in service last month. It will supplement existing PG and E-Edison ties at McGunden and Piedra in the San Joaquin Valley and will provide greater flexibility and reliability in interchanging up to 250,000 kw of power between the two systems.

PUD Files Condemnation Suit Against WWP

The Stevens County PUD of Colville, Wash., has filed a condemnation suit against Washington Water Power Co. properties in the county, proposing to pay a figure it rejected as too high five years ago.

In a similar suit in 1948, a jury priced the properties at $2,500,000 but the PUD let matters drop. Now the enlarged district proposes to raise such a purchase fund by floating 30-year revenue bonds.

The suit was filed by Thomas I. Oakshott, Oakville attorney, on a resolution signed by Joe Garvey, PUD president; P. L. McKern, secretary, and Walter D. Smith, commissioner. Named with Washington Water Power are the City Farmers Trust Co. of New York and Ralph E. Morton of Greenwich, Conn., alleged to hold interest in WWP properties.

The suit is against transmission facilities and a hydro plant on the Colville River.

BPA Lets Contracts for Distribution Lines

Bonneville Power Administration is moving ahead with construction programs based on Congressional committee action assuring funds for facilities on its distribution lines.

Contract was awarded June 26 to Western Electric Construction Co., Portland, for $85,657 for building a double-circuit 230,000-v line extending BPA's heavy-voltage grid into Portland and the Willamette Valley and an extension on its Astoria-St. Johns 115,000-v line.

Bay Construction Co. Inc. and Don L. Cooney Inc., Seattle, was awarded construction of the Big Cliff-Detroit Dam 13,800-v transmission line on bid of $134,454. This will link generators at Big Cliff-Detroit Dam now under construction as a reregulation dam with recently dedicated Detroit Dam on Santiam River. Big Cliff will have 18,000 kw installed capacity when ready April 1954.

Fairbanks Voters Approve Bond Issue for Expansion

Voters of Fairbanks, Alaska, have approved 5 to 1 a $3,000,000 revenue bond issue to finance expansions and improvements of the municipal utilities system, including additions to its boiler, steam turbine and electric generating plant and electric distribution system. The city's system also operates steam heat, telephone and water services.

Election July 14 signaled the start of planning for plant facilities to cost $1,550,000; power distribution improvements of $100,000; telephone plant and cable installations of $500,000; a second steam main for the downtown business area, $330,000; other amounts have been budgeted miscellaneous items for central garage, buildings, wages, interest and legal and consulting expenses.

● **Clark County** PUD of Vancouver, Wash., has voted to join other southern Washington PUDs in a Columbia-Snake River public power system, the contract to become valid after six or more other PUDs join the system. The contract would authorize members to make joint investigations of power sources, steam as well as hydroelectric.

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A. "CBM" stands for CERTIFIED BALLAST MANUFACTURERS. Nine of the country's leading manufacturers of fluorescent ballasts comprise the CBM group.

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Q. What's the need for specifications?

A. Ballasts are the heart of fluorescent lighting. CBM specifications make certain the ballasts provide best possible performance for the lamps they operate.

Q. How do CERTIFIED BALLASTS benefit you?

A. When fluorescent lamps do not perform in accordance with published ratings, low quality or improperly designed ballasts may be the cause. However, most lamp manufacturers waive this possibility if the ballasts involved are CERTIFIED.

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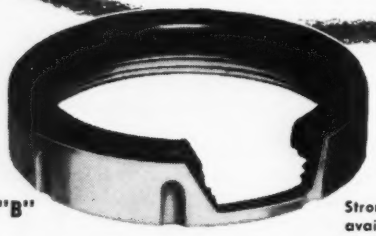

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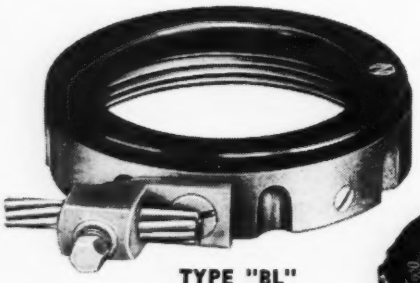

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One Sure Way to Get MORE DEFENSE FOR LESS MONEY

How can we get more national defense for less money? The best answer yet given to this question appears in a little-noticed section of the new defense budget. That answer, with which this editorial is concerned, is to provide more equipment with which to step up munitions production in an emergency. Thus we can eliminate much of the need to stockpile finished munitions in advance.

The new defense budget provides an appropriation of $500 million, to be invested by the Secretary of Defense in specialized facilities required to produce munitions on a wartime scale, but not adapted to profitable operation by private industry in normal times. Facilities of this type are known as "stand-by capacity."

There is no strictly political controversy over the "stand-by capacity" program. It was originally suggested by Clay Bedford, Special Assistant to the Secretary of Defense during the Truman administration. It has since been reviewed and endorsed by the Eisenhower administration. Moreover, it involves little or no technical controversy. Civilian and military experts are well agreed that the only alternative to enormous expenditures for stockpiling military equipment is to provide enough facilities for producing it quickly in an emergency.

Here is the Key Idea

In his speech of May 19, introducing his defense budget to Congress and the nation, President Eisenhower stressed the value of such reserve capacity in these terms, ***"The more swiftly and smoothly we can mobilize, the less our dependence upon costly standing armies and navies."***

In accord with this idea, the $500 million requested for the present reserve capacity program would be invested in tools that require a long time to produce, and so present grave complications in an emergency unless they are ready in advance. Some such tools would be installed in new plants that are needed to eliminate potential bottlenecks in the defense production program. Others would be ordered to replace that part of the government's present machine-tool inventory which is made obsolete by changes in the design of defense products. By completely "tooling up" with the most modern equipment, the admin-

istration hopes to realize a production potential many times greater than could be achieved by spending the same amount of money on military end-products.

Examples of Savings

In the specialized field of defense production, adequate modern capacity is the key to both economy and speedy delivery in a pinch. Here are some striking examples from the recent report of the Advisory Committee on Production Equipment (Vance Committee) to the Director of Defense Mobilization:*

—In the case of certain ammunition components, the cost of new capacity can be recovered in only six weeks of full production.

—If $500 million worth of special tools needed to make aircraft are purchased in advance, aircraft production during the first two years of war will be increased about $18 billion. In other words, it costs 1/36 as much to acquire the tools in advance as to acquire the aircraft.

—In the case of a certain ordnance item, an expenditure equal to the cost of only 150 units of the item will provide the capacity to produce thousands and save three years' time in meeting mobilization requirements.

Moreover, reserve plants and equipment can be kept up-to-date at only a small fraction of the cost required to maintain an up-to-date reserve of military end-products. The cost of replacing 5,000 obsolete tanks is at least $1 billion. The cost of new tools for a tank plant would be less than 10% of that amount.

*This Committee, headed by Mr. Harold Vance, President of the Studebaker Corporation, included Clay Bedford, then President of Chase Aircraft, Manly Fleischman, former Defense Production Administrator, and several retired military leaders with wide experience in procurement.

Savings Will Multiply

On the basis of facts like these, the Vance Committee recommended that the Defense Department spend $500 million to $800 million per year on specialized defense production facilities in order to provide substantial reserve capacity as soon as possible. It also recommended that expenditures for military end-products which get obsolete rapidly be held to a minimum. The Eisenhower administration has adopted this approach to the problem of munitions production in asking that $500 million be invested in reserve capacity.

The importance of this approach is much greater than is indicated by the amount of money to be spent on new tools, although this amount will go far toward assuring a healthy machine tool industry, adequate to meet emergency demands. ***What is really important is the great saving that can eventually be made in the cost of our defense program by a modern tooling program.*** If we are to maintain this program for a long period, and if we are to pay as we go, we must have a low-cost program. No other plan to reduce and control the cost of a garrison economy can compare with the new approach suggested in the Vance Report and now embodied in the new defense budget.

Congressmen will do well to scrutinize all military appropriations carefully. They have a chronic tendency to be too big. But there should be no penny-pinching on investments in capital equipment that will pay out in as short a time as six weeks in a war emergency. It would be tragic if this opportunity for real economy were lost in the controversy over other aspects of the defense program. ***The tooling program is a key part of the Eisenhower effort to cut defense costs. It should be promptly approved.***

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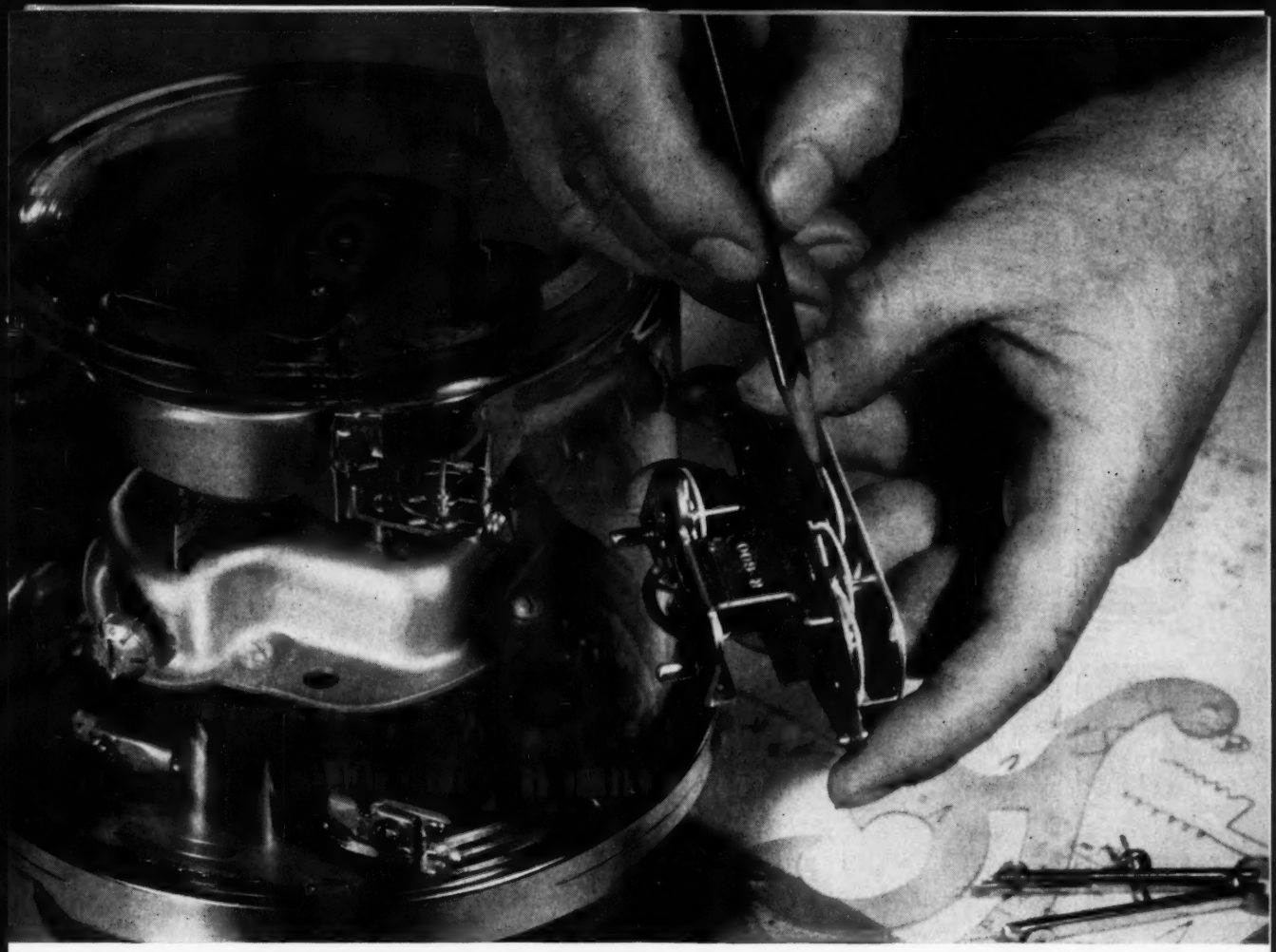

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BC ELECTRIC PLANS HYDRO EXPANSION

A $13,000,000 hydro program to add 120,500 hp to B. C. Electric's lower mainland power system during the next two years has been announced by President A. E. Grauer.

According to plans, two generating units will be built. Number 4 machine, a 62,000-hp unit, will be installed at the Bridge River plant, making it the largest in the four Western provinces, with 248,000 hp. Work on this $5,000,000 project will get underway immediately and power delivery is scheduled by midsummer of 1954.

Surveys are now being completed and work will start in the fall on a power station at the mouth of Seton Creek, about 25 miles east of the present Bridge River plant. This development will cost more than $8,000,000 and will be ready for service by August 1955.

With these projects and the raising and lengthening of LaJoie Dam, B. C. Electric will spend approximately $21,000,000 on construction in the Bridge River area in the 2½-year period, Grauer pointed out.

Edison Starts Work in Vermilion Valley

Site clearing and stripping has been started for Southern California Edison's $8,500,000 Vermilion Valley power reservoir.

A further development of Edison's Big Creek-San Joaquin River hydroelectric facilities, the project will permit addition of an annual 122,000,000 kwh to present output of the company's six existing power houses in the area, or as much as 440,000,000 kwh in exceptionally dry years.

Vermilion Dam, to be built across the Mono Creek in Fresno County, will be an earth-filled structure 160 ft high with a crest length of 4,234 ft. It will form a reservoir with a capacity of 125,000 acre-ft.

The dam will not only provide additional regulation and water storage for Edison's power houses, the company points out, but will help San Joaquin Valley residents by providing more irrigation water during dry years and increasing conservation and flood control facilities.

Edison has applied to FPC for permission to build a project including a power house and another reservoir at nearby Mammoth Pool, on the upper San Joaquin River. The power house will have a generating capacity of 126,000 kw. Water in the 123,000 acre-ft reservoir will also enable other Big Creek power houses to generate an estimated additional 86,000,000 kwh annually.

Bechtel Corp. is contractor for the Vermilion Valley project.

PG and E Line to Link Steam Plant, Substation

Work is proceeding on installation of a $5,400,000 power transmission line that will link Pacific Gas and Electric Co.'s Pittsburg steam plant with Panoche substation in Fresno County, Calif., although construction of the steam plant halted when AFL laborers walked off the project.

The line, to be completed next spring, will run from the Pittsburg plant to a point south of Brentwood, and from there it will parallel the Contra Costa-Tesla and Tesla-Midway circuits to Panoche. The 61-strand all-aluminum conductors will be the largest in diameter—1.216-in.—ever installed by PG and E. When completed, the line will include 2,150 tons of aluminum conductor, 56,380 insulators, and 573 steel towers averaging 100 ft in height. Some 4,130 tons of steel will go into the towers, now being built.

Plans for the line call for 14-15 insulators per suspension, with as many as 20 to the string for dead ending.

Much of the work on the line is done by PG and E employees, and it was spared the fate of the $75,000,000 Pittsburg steam plant, where laborers struck in protest against Bechtel Corp.'s refusal to grant their demands for a 15c wage hike.

● **Centralia,** Wash., City Commission has awarded a $115,550 contract to the S. Morgan Smith Co. for a 75,000-hp turbine to be installed in the city's expanded hydroelectric plant on the Nisqually River and was to open bids Aug. 11 for a 6,250-kva generator also needed for the project. Delivery of the turbine is scheduled for fall of 1954.

● **Baldwin-Lima-Hamilton** Corp. has been awarded an $853,250 contract for the construction of four 15½-ft hydraulically operated butterfly valves for the Palisades power plant. The valves will be used for shutting off flow to the hydroelectric turbines and will function under a hydraulic head of 241 ft. It is expected that complete delivery will be made by January 1955.

● **A 10% cut** in power rates for commercial and industrial users has been approved by the Ellensburg, Wash., City Council for its municipal lighting system.

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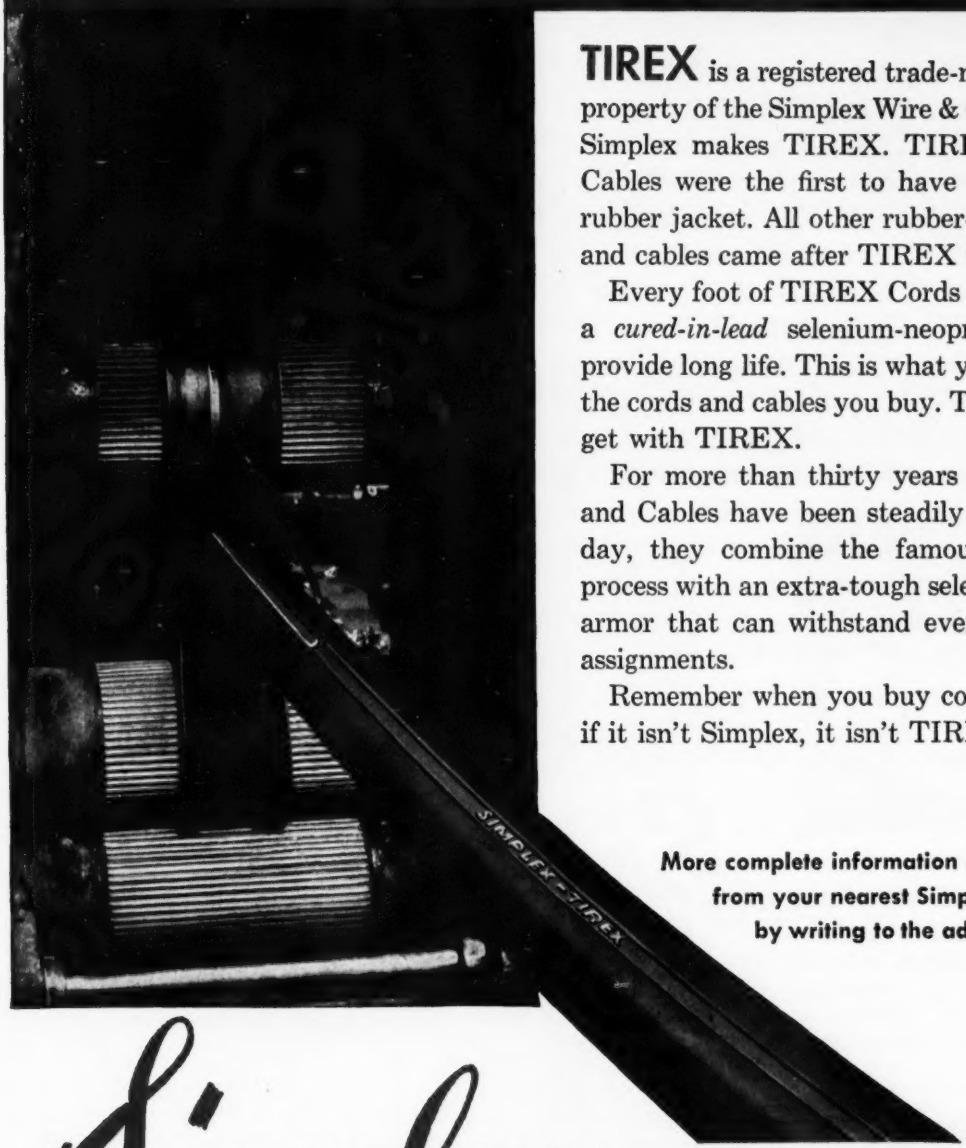

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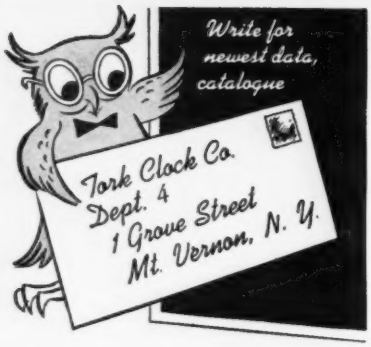

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HEARINGS CONTINUE ON MERGER PLAN

At July hearings before the Washington State Public Service Commission on proposed merger of Puget Sound Power & Light Co. with Washington Water Power Co. these points were brought out:

L. E. Karrer, executive vice-president of Puget, said his company is ready to launch a $30,000,000 expansion program if it remains an independent organization.

Ford, Bacon & Davis, which had been retained by the commission last April to make an independent study of the possible effects of a merger on the two companies reported that the advantages resulting from it would more than offset the disadvantages. The report held that economies would more than offset added costs.

The matter of a possible rate increase was brought up by Dr. Lionel W. Thatcher of the University of Wisconsin; Fred Kleinman, chief of accounts and finance for the Illinois Commerce Commission, and Prof. Arthur M. Cannon of the University of Washington. All maintained it was questionable whether WWP could maintain its present earnings and dividends after the merger without increased rates, although admitting that any actual effect the merger would have on rates would be impossible to determine until the final terms of the merger are completed.

Gordon D. Jorgensen, engineer for R. W. Beck & Associates of Seattle, made comparisons of WWP rates with those of municipals and PUDs in the state. WWP attorneys objected to this testimony and Frank Hayes, assistant attorney general, moved that all testimony comparing rates other than those of the two companies concerned be stricken.

Jorgensen also testified that the merged company would have additional expenses of $149,018 a year to equalize the wages paid employees of the two companies.

Ed Weston, president of the Washington State Federation of Labor, contended the merger agreement lacked adequate provisions for labor.

Charles Hodde, grange official, said he felt the good will WWP has built up would be endangered, predicting a number of condemnation suits would be filed against the merged company by public power agencies.

J. H. Clawson, Puget Power treasurer, read into the record a statement sent by the management to stockholders, declaring the company is taking a neutral position on the merger and stating that the plan was favored by stockholders in both companies.

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As one of several types of ANACONDA power cables, DURASHEATH is available in all sizes, single or multiconductor, copper or aluminum, from 600 to 15,000 volts. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

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†*when ordered to CAA Specifications L-824*

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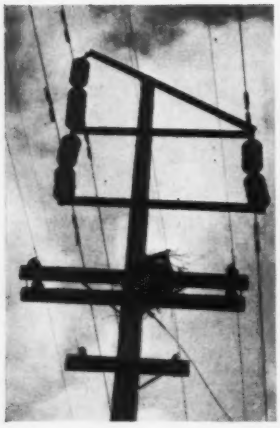
ANACONDA ON THE PACIFIC COAST: Plant at: Orange, Calif. District Offices at: Los Angeles, Calif.; San Francisco, Calif.; Seattle, Wash.



"Black Scoundrel" is a fitting name for the crow, in the opinion of these PG and E trouble men, O. I. Roe and W. W. Williams Jr. The mat in the box is the remains of a crow's nest that was built of wires of all kinds, ranging in size from ¼-in. iron to crate binding straps 5 ft long and small, rubber-insulated drop cord. The men don't know whether Mrs. Crow was trying to install an electric incubator when she built her nest in contact with a 12,000-v line, but they can state that she had electric heat. That is proved by electric burns on the wires and the fact that the nest lining was burned out

Heavy Runoff Increases Hungry Horse Storage

Heavy runoff of the Columbia basin snowmelt at higher elevations of the Rocky Mountains will mean unexpected increments of water storage at Hungry Horse Dam in western Montana.

Reporting to Pacific Northwest Power Pool utility members July 20, Bonneville Power Administration noted all pool and basin reservoirs—except Hungry Horse—are full or spilling and the big upper basin reservoir is expected to have 2,300,000 acre-ft of usable storage at beginning of the storage drawdown season in mid-September. Only 2,000,000 acre-ft were originally scheduled for the 1953-54 winter season.

Heavy rains over most of the Northwest through May into mid-June had promoted sharp upward revisions on basin water resource forecasts while the cooler weather of the late spring months reassured pool operators of hydro facilities that there was little chance of the 1952-53 shortage developing. In the week ending July 16, for example, stream flow at Coulee was 255,000 cfs compared with median year flow of 180,000 and minimum year flow of 153,100; at Bonneville natural flow was 363,000 cfs compared with median 229,600, minimum 202,700.

The importance of Hungry Horse storage is in downstream firming potential. From the site on the south fork of the Flathead River, controlled flow can add to generation during the winter months at Montana Power's Kerr Dam, Washington Water Power's Cabinet Gorge, Grand Coulee, Chelan PUD's Rock Island and Bonneville. By December two new 70,000-kw generators, the first of 14, will be turning at McNary Dam.

● **University of Washington** has been awarded an $85,000 contract by the Corps of Engineers for research on how to coax downstream migrant salmon and steelhead safely past dams that may obstruct their course. One phase of the study will seek ways of guiding the fish around dams by electrical methods, light, changing water velocities and temperatures. Fish and game agencies of Washington, Oregon and Idaho will cooperate with the University's school of fisheries in the study.

● **Wage increases** averaging about 7% have been granted 700 employees of the Salt River Valley Water Users Assn. and Salt River Power District at Phoenix, Ariz. The power district has approximately 500 employees and the Water Users 200. Typical increases include a hike from $2.09 to $2.23½ per hour for transitmen and from $1.17 to $1.25 for watchmen.

● **California Public Utilities Commission** has given California Oregon Power Co. authority to borrow up to $7,000,000 from the Chase National Bank and three other banks. The utility won approval for its application for a credit agreement, secured by promissory notes, to be available until March 1, 1954.

UTILITY EXHIBIT HAS LONG TOUR IN STATE

"The Colorado Story," Public Service Co. of Colorado's prize-winning exhibit, has been touring the state since March 1952 and is now booked into the spring of 1954. Fifty panels mounted on 27 sheets of Masonite, the exhibit emphasizes what the state's pioneers were able to do under a democratic government that allowed freedom for the individual. It won the Freedom Foundation's highest award in its class.

The exhibit has been shown at schools throughout the state. It is usually shown for three or four days at major high schools, two days at junior high schools and one day at grade schools.

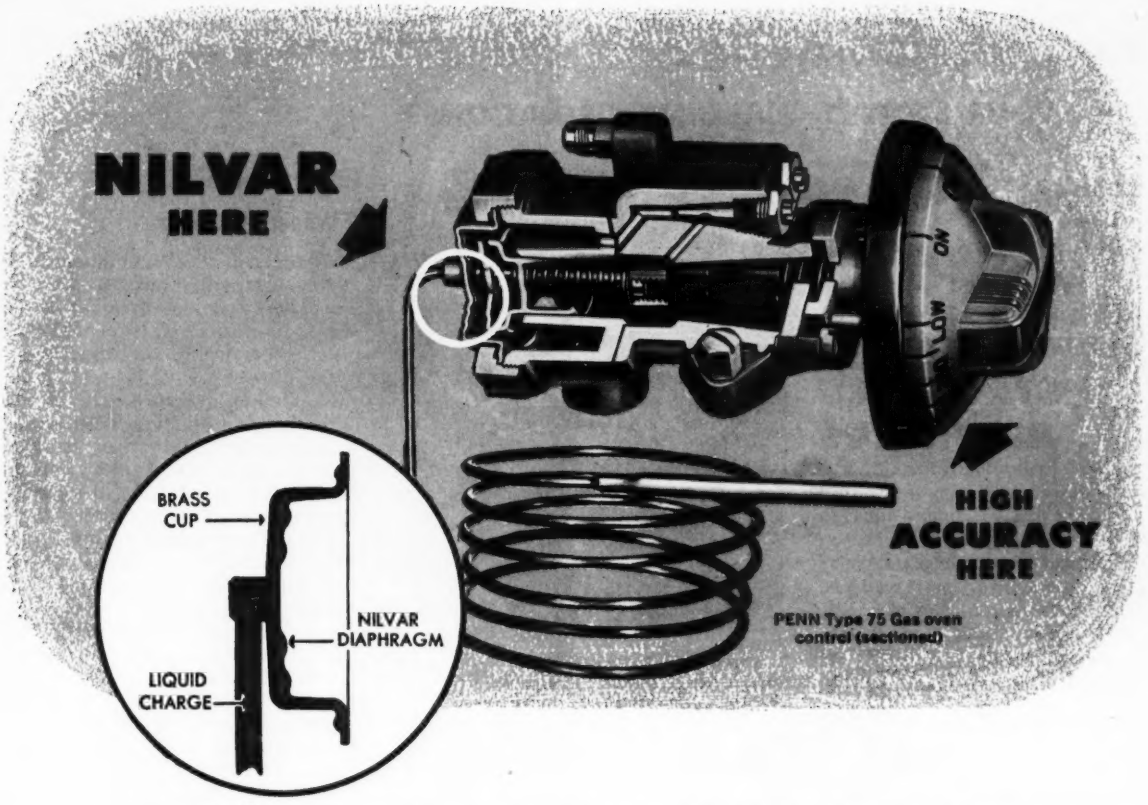
Although it was designed primarily for junior and high school students, it has attracted attention of adults and has been shown at the University of Colorado, the Denver City and County Bldg. and elsewhere. It will be on display this summer at Hospitality Center, an information headquarters in Denver's civic center operated by the city's Convention and Visitors Bureau.

Count has not been kept of the persons viewing the exhibit but the guest register was signed in 1952 by more than 72,000, probably only a fraction of those who saw the panels that year.

The display is refurbished regularly to keep it in good condition. Each panel is 28x48 in. and the group takes a minimum of 65 ft of wall space. No one accompanies the exhibit but detailed instructions for its installations are sent along.

● **Value** of Pacific Power & Light Co. properties in Washington state has been established by the State Tax Commission at $35,000,000, an increase of $5,000,000 over a year ago because of its new Yale Dam. Valuation of the Washington Water Power Co. increased $2,500,000 to $39,000,000 and that of the Inland Empire Rural Electrification Inc., $195,000 to $1,945,000. Valuation of other privately owned public utilities in the electrical field remained unchanged.

● **Pacific Gas and Electric** Co. vehicle drivers in Sacramento, Calif., chalked up 736,261 miles without an accident from Oct. 1, 1952, to March 31, 1953, to win a fleet traffic safety contest sponsored by the Sacramento Safety Council. A plaque was presented to H. A. Danielson, safety program chairman for the PG and E, at a safety award banquet sponsored by the council.



Nilvar* Alloy Makes New PENN Gas Oven Controls Self Compensating

By providing a self-compensating flexible diaphragm assembly for its liquid expansion controls, PENN Controls, Inc. compensates for ambient heat and eliminates control time-lag. Result: controls *accurately* maintain the temperature dialed.

The PENN Self-compensated Diaphragm assembly utilizes a brass retaining cup and a flexible Nilvar diaphragm to form a hollow chamber. This connects to the temperature bulb through a capillary tube, the entire unit being filled with a liquid charge.

Because brass expands much more than Nilvar, ambient heat *simultaneously* increases the volume of the chamber, when it increases the volume of the liquid charge. This self compensation reduces the effect of ambient heat on the diaphragm to zero and permits the diaphragm to respond *only* to bulb temperatures.

PENN specifies Nilvar for this application because it has a very low temperature coefficient of expansion — as low as .000001/C°— lowest of any alloy, and comparable to that of quartz. And its consistent uniformity helps maintain the high accuracy which PENN production standards require.

The remarkable dimensional stability of Nilvar may answer your engineering problems too. Why not talk it over with us. We'll be glad to make recommendations geared to your specific needs.

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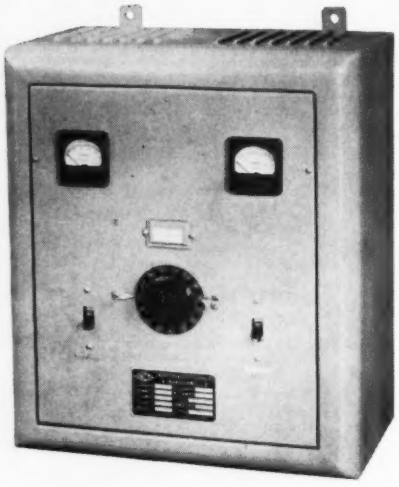

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NEWS ABOUT PEOPLE

Utility Announces Personnel Changes

Changes in the Washington Water Power company's general office organization and new appointments in division managerships were announced recently by President Kinsey M. Robinson.

Kimball I. Jack, former head of the advertising and publicity department, was named manager of a newly formed general sales, promotion and information department designed to coordinate public and employee information and sales programs.

The production plant maintenance and construction department has been consolidated with the power supply department under **Marshall L. Blair,** chief of system operation. **James S. McNair,** who has headed the production department since 1943, will continue as production consultant.

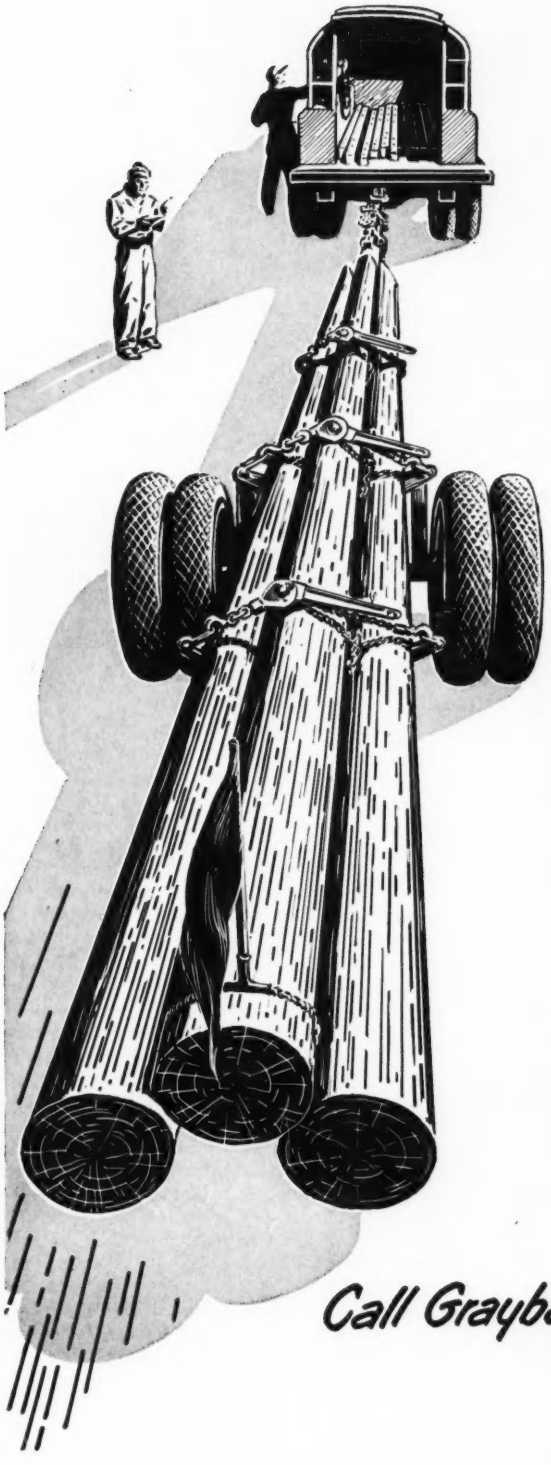
The title of transmission and distribution has been abandoned in favor of "engineering department," with its former superintendent, **Lester R. Gamble,** named chief engineer. Engineering functions in other departments are being consolidated under this new department as are easements and rights-of-way formerly under the secretarial department.

● **Clyde H. Spencer,** the man who supervised the building of USBR's Hungry Horse Dam, has succeeded **Richard L. Boke** at Sacramento, Calif., but with the title of supervising engineer instead of regional director. Spencer will reorganize the bureau's Region II office in Sacramento. By recent action of the Interior department, Region II was abolished as such and the California Projects Office was established in its stead. Some of the changes proposed include abolishment of the bureau's power branch; elimination of district offices in cities in California's central valleys; discontinuance of Sacramento River water rights studies.

● **W. D. Virtue,** vice-president and secretary of Public Service Co. of Colorado, was elected treasurer to fill the vacancy created by retirement of **D. G. Guiney,** who had served the company for 45 years. **H. A. Mitchell,** assistant secretary and assistant treasurer was made secretary. Virtue will continue as a vice-president and Mitchell as assistant treasurer.

POLES and CROSSARMS

– via GraybaR



There's a type of pole and crossarm for every power-line requirement. And an order placed with Graybar means that you can get the kind you need *when* and *where* you need it.

Because differing conditions influence local preferences, Graybar distributes *all* types of poles – full-length, pressure-treated Fir and Cedar... butt-treated Northern and Western Cedar. They're all carefully selected and processed to provide maximum strength and durability.

Graybar-distributed crossarms are seasoned under rigid methods – are strong, long-lasting and provide a wide margin of safety in the line.

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GraybaR *Everything Electrical*

IN OVER 100 PRINCIPAL CITIES

Tice

● **H. W. Tice,** Southern California Edison Co. vice-president since 1945, has been elected vice-president and general manager of the company. He will be the senior administrative officer in charge of field departments and their related activities. Tice joined the company in 1922 as an electrician at Visalia. The following year he was transferred to the Los Angeles headquarters as general foreman and in 1927 became operating engineer. He was made assistant manager of operation in 1937, manager of operation in 1941.

● **Ricklef A.** (Rick) **Reid,** a veteran of 33 years' service with Montana Power Co., has been promoted to the position of superintendent of generation. He succeeds **Everett A. Hamilton,** who retired May 30. Former assistant superintendent in the department, Reid joined the company in June 1920 as an employee at the Rainbow generating plant in Great Falls. He was named superintendent of Great Falls generating plants and transmission lines in 1943 and was transferred to Polson as foreman of the Kerr hydroelectric plant in April 1950. In November 1950 he became assistant general superintendent of generation with headquarters in Butte.

● **Harold S. Schuler,** who has directed Westinghouse Electric Corp.'s Pacific Coast district sales promotion activities since 1939, has been made assistant manager of general advertising at Pittsburgh. Named manager of the Pacific Coast district application data and training department in his stead is **William C. Swinghamer,** who has been application data and training representative at Pittsburgh and St. Louis.

● **Commissioner Claude L. Draper** of Wyoming was unanimously elected vice-chairman of FPC to serve during the remainder of the calendar year. He succeeds Harrington Wimberly, whose term on the commission expired June 22. Originally appointed by President Hoover in 1930, Draper, a Republican, is dean of the commission in point of service.

Albert

● **E. K. Albert,** vice-president and chief engineer of California-Pacific Utilities Co., San Francisco, was elected executive vice-president by the company's board of directors in July. At the same time **E. E. Kime,** vice-president and manager of the eastern Oregon division headquarters at Baker, was elected a director; **D. J. Ley,** assistant secretary, was made treasurer; **J. B. Jones** was elected assistant secretary and auditor. Albert joined the company as chief engineer in February 1939 and was elected vice-president and director in October 1941. A native Californian, he was graduated from USC in electrical engineering. Before joining California-Pacific, he was with Southern California Telephone Co. in Los Angeles and Northwestern Public Service Co., Huron, S. D.

● **Ira W. Collins,** formerly general superintendent of power control for Pacific Gas and Electric Co., has been made assistant to the new vice-president in charge of operations, **George H. Hagar. Jack H. Martin** will succeed him as general superintendent of power control. **Robert H. Miller** will become assistant general superintendent of power control. **Robert L. Brinton** will take over Miller's former post in charge of radio and telephone communications.

● **Karl M. Bausch** has been named chief electrical engineer of the power division of Bechtel Corp.

Deaths

● **Allen G. McBride,** principal owner and manager of Elko Lamoille Power Co., Elko, Nev., aged 69, died in his sleep, July 7. Four days earlier he had served ice cream to the children at a July 4 barbecue. Civic minded, colorful, native of Winnemucca, son of the railroader first mayor of Elko, he was prominent in lumber and cattle business and took over the small power company on the death of his brother years ago.

Charles E. Bramble

● **Charles E. Bramble,** 61, vice-president, treasurer and director of the California-Pacific Utilities Co. since 1941, died of a heart attack July 15 at his home in Oakland, Calif. A native of St. Louis, Mo., he began his career as an accountant in the transportation field and at one time was with Union Pacific at Portland. In 1929 he was elected secretary-treasurer of various subsidiaries of National Electric Power Co. He later became associated with the United Public Utilities Corp. and was vice-president and treasurer of the Ohio and Indiana subsidiaries when he returned to the Pacific Coast.

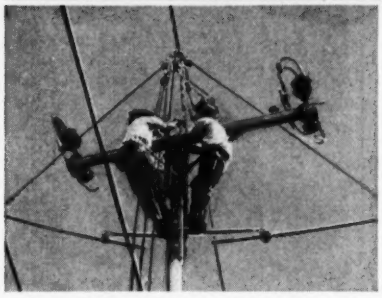
● **William Wuelker,** owner of Wuelker Infra-Red Lighting Co., San Francisco, and creator of the "Baby White Kitten" lighting reflectors, died at Marin Hospital, July 10, after a long illness.

● **Earl Bond Hansen,** 56, an electrical engineer for the Pacific Telephone and Telegraph Co. at Seattle, died July 3. A member of the American Institute of Electrical Engineers, he had worked for the company since his graduation from UC in 1920.

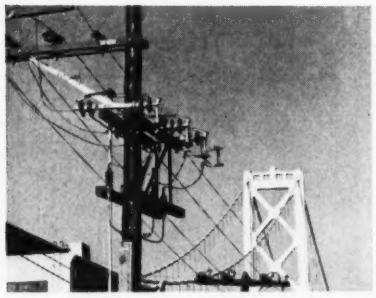
KPF

AIR BREAK SWITCHES

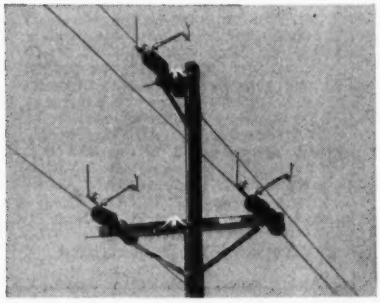
Standard for nearly half a century



Installing KPF Type A-202 switch hot on 12 kv line. KPF phase units are shipped completely assembled, ready for quick installation.

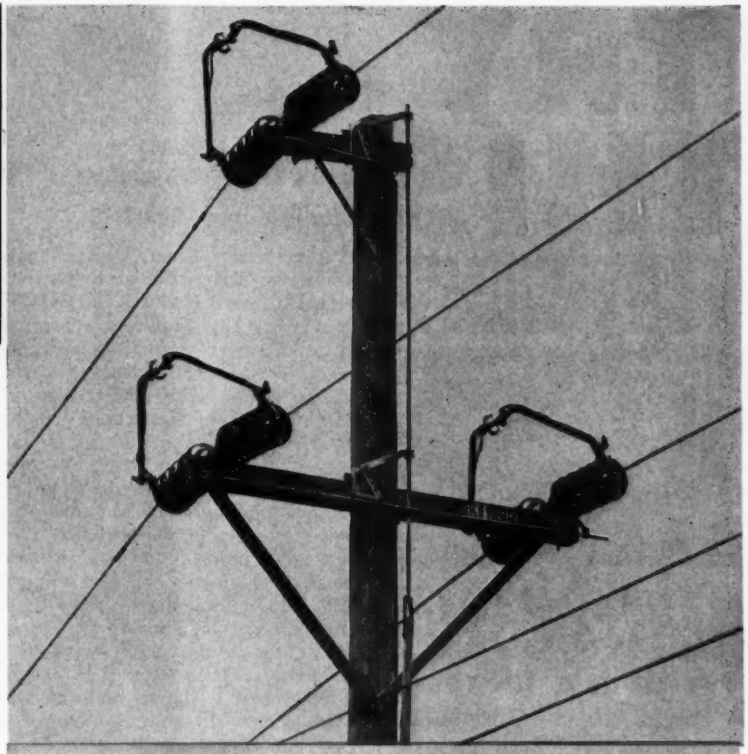


Horizontal-mounted KPF Type UF-2 switch in metropolitan service (P.G.&E., San Francisco). Versatile KPF switches operate equally well with or without line tension.



KPF Type S-205 switches with inexpensive Quick-Break attachment on 60 kv rural transmission line. Switch shown in open position.

2825



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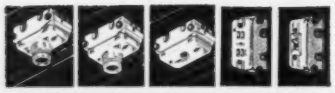

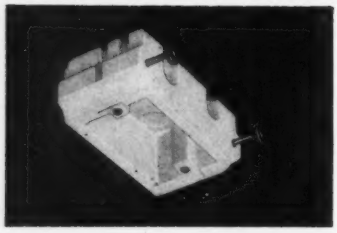

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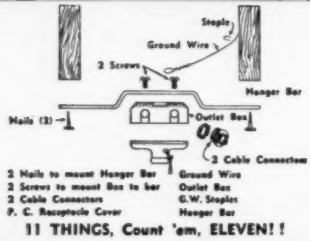
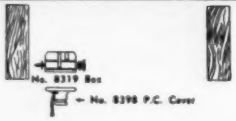


11 THINGS, Count 'em, ELEVEN!!

SIMPLIFY TO THIS



1 No. 8319 Box
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} Nothing Else

NO Hanger Bar
NO Loose Nails
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NO Connectors
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NOTES ON THE TRADE

Firm's Executive Makes World Tour of Markets

René Vodoz, general sales manager of Brown Boveri Corp., Switzerland, recently visited Delius & Thomas, the company's San Francisco representatives, in connection with a world tour of markets. Having just left Japan he had some interesting observations concerning the industrial economy of that country. America's military is spending $800,000,000 a year in Japan, upon which its economy is dependent, he said. Machine tools are old—hence prices are higher. Nevertheless, there is a rapid industrial expansion taking place and all nations are going to Japan for goods. Before the war the Japanese copied, now they try to get licenses from all over the world.

There has been a great trade union development in Japan and the work week is now 48 hours as against 60 hours. Average wage is 18c per hour, but it takes three Japanese to do the work of one American or European. Japan is in a good competitive position with America and Europe on heavy goods.

After visiting American cities Vodoz planned to spend some time at Brown Boveri's Canadian plant where low-voltage breakers and transformers are among electrical equipment being built. Photostat copies of factory drawings there would enable the Canadian plant to give service on this continent in case of war.

● **Utility Body** Co. of Oakland, former distributor of motor vehicle equipment for public utilities, has gone into the manufacturing field, with a line of service and line construction bodies for equipment trucks. **John Podlesak** is president and **Howard Hansen** secretary-treasurer of the firm, which plans distribution of its line in all the Western states. The bodies are available to truck dealers as well as utility companies.

● **Electric Wiring** with Alcoa Aluminum is a new film in the manufacturer's series of "how to do it" motion pictures. It is designed for the man on the job and deals almost entirely with techniques of handling and joining in installing aluminum conduit, cable and wire. A pocket-sized folder is given each person who sees the film as a checklist for points explained.

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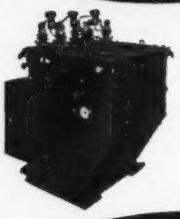
INTRODUCES
ITS NEW LINE OF

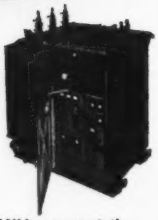
STEP VOLTAGE REGULATORS



20.8 Kva, 2400 Volts through 750 Kva, 13,800 Volts

UNIT SUBSTATIONS

1000 Kva through 3000 Kva, 12,000 Volts through 34,500 Volts Primary



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Noveski

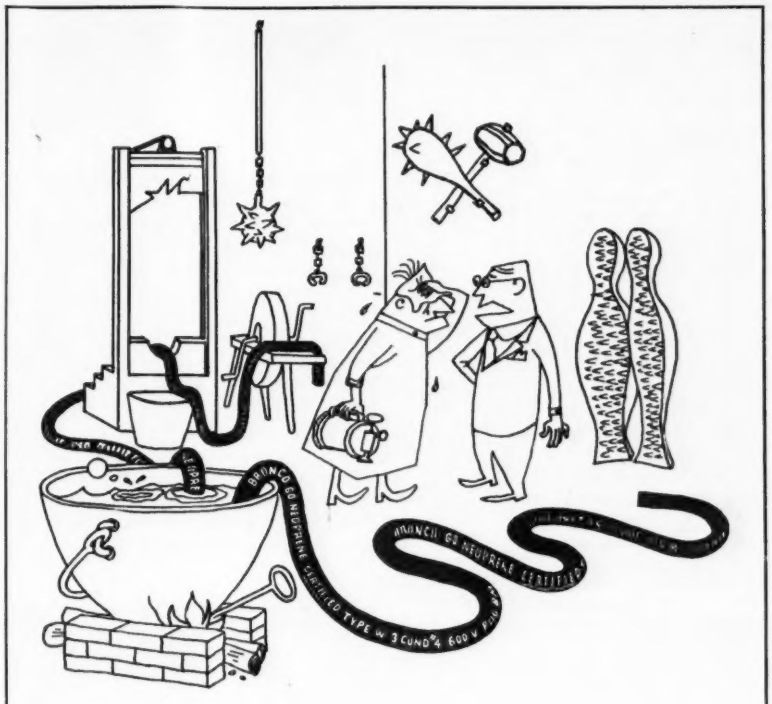
● **Appointment** of **Joseph L. Noveski** as national sales manager has been announced by Sunbeam Lighting Co. of Los Angeles, manufacturer of fluorescent and incandescent lighting equipment for commercial and industrial installations. Noveski was formerly associated with G-E Supply as Los Angeles district supply sales manager. He was with that company in Los Angeles for 14 years and for a two-year period headed up its Phoenix and Tucson district sales offices.

● **Line Material** Co. has appointed **Harold T. Zamzow,** former manager of capacitor and regulator sales, to the new position of Western apparatus manager. With headquarters in San Francisco, he will supervise apparatus engineering activities in 10 Western states. After being graduated from the University of Nebraska in 1935, Zamzow was in the utility and consulting engineering fields for 11 years. He joined Kyle Corp. in 1946 and handled sales promotion in the Western states. When Kyle was merged with Line Material in 1948, he was appointed apparatus engineer for the Mountain States division, a position he held until he was made manager of capacitor and regulator sales in July 1952. Appointment of **Earl M. Stites** as San Francisco field engineer was also announced by L-M.

DIRECTORY ADDITIONS CORRECTIONS

Manufacturers' Directory

FISHER-PIERCE CO., INC., 170 Pearl St., South Braintree, Mass.—Oscar Hogenson, 95 Connecticut St., Seattle; Charles F. Klaus, 1004 S. E. Belmont, Portland; E. V. Roberts & Associates, 5068 W. Washington Blvd., Los Angeles; Allen I. Williams, 1009 17th St., Denver; Maydwell & Hartzell, Inc., 158 Eleventh St., San Francisco, in central and northern California, and western and southern Nevada.



no *excuses sneedly — it's your job to damage the stuff!*

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Beautiful opportunity for electrical engineer, preferably 30 to 35, who is experienced in power-switching equipment, also sub-station structures and layout.

New line of equipment now being developed offers excellent chance for advancement with leading manufacturer of electrical transmission and distribution equipment in Midwest location.

Write Box 273, Electrical West, 68 Post St., San Francisco 4, Calif.

WORLD'S LARGEST INVENTORY

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MOTORS–GENERATORS–TRANSFORMERS
New and Guaranteed Rebuilt
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P. O. BOX 51, ROCHESTER 1, N.Y.

EXTRA Holding Power QUICKLY Installed TOUGH For long life

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For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

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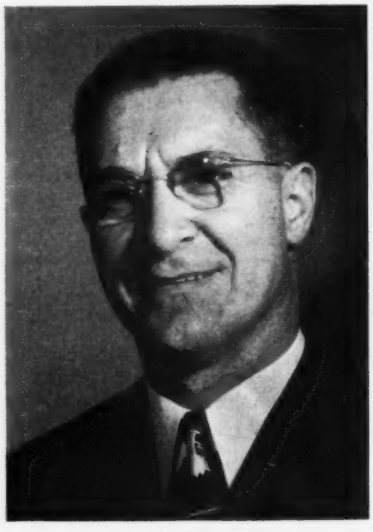
PROFILES

Wilbur A. Dexheimer, last month appointed reclamation commissioner, has spent two decades on USBR's Western construction projects. Assistant chief construction engineer at Denver when he received his new appointment, he has worked on the Yakima project, Boulder Canyon project, Hoover Dam and power plant, Bartlett Dam in Arizona, Shasta Dam and power plant. During World War II he was with the U. S. Engineers; became staff engineer for General Stilwell in the China-Burma-India theater. He was discharged as lieutenant colonel in 1946; was with Morrison-Knudsen International; acted as consulting engineer for the Republic of China at Shanghai, studying railroads, ports and highways

Dexheimer



Collins

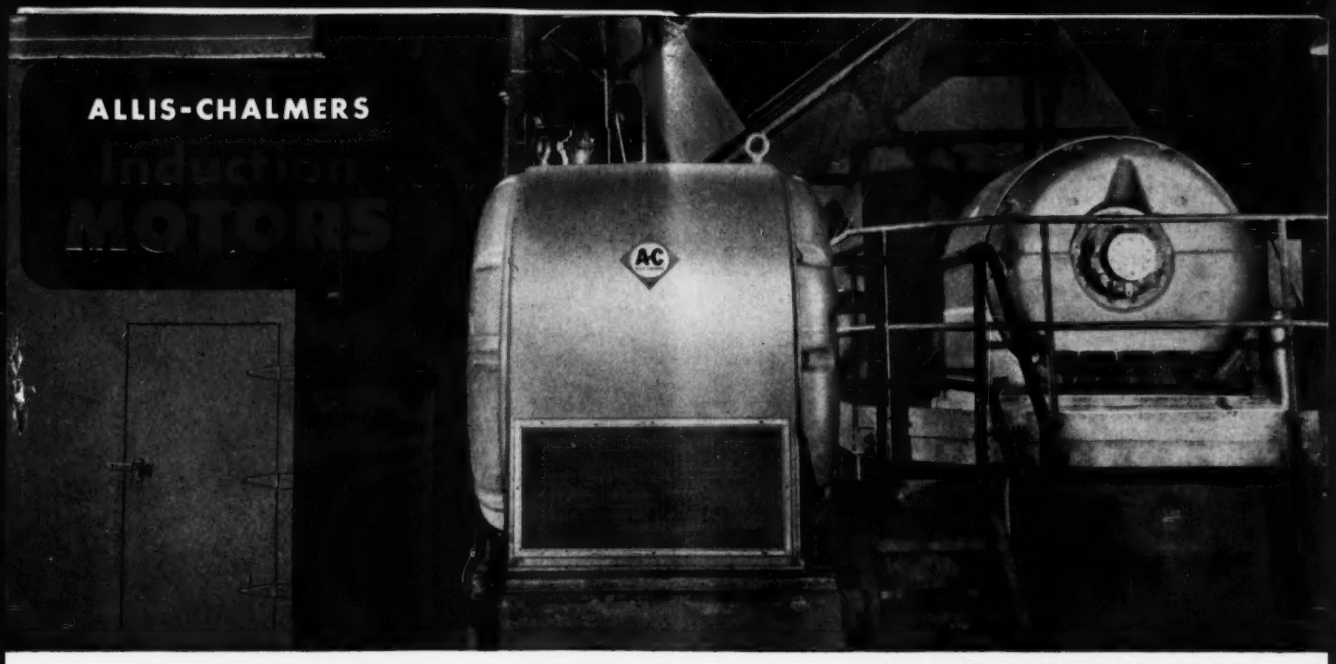
Ira W. Collins, formerly general superintendent of power control for Pacific Gas and Electric, has been made assistant to the vice-president in charge of operations

Muchmore

Richard W. Muchmore is now chief engineer in charge of production for Petersen Engineering Co., San Carlos, Calif., maker of earth augers. He was with Federal Mogul

Richard H. Syring has been made assistant to the secretary of Pacific Power & Light Co. and will work on reports and data for specialized needs of institutions and stockholders. He has been Pacific Northwest bureau chief for the Wall Street Journal for eight years and before that was the Pacific Coast editor for Business Week. Previously he was with the Oregon Journal

Syring



Left to right (above) are drip-proof, silicone insulated, 1000-hp, forced and induced-draft fan motors for unit No. 2. Forced draft fan motors for unit No. 3 will be of the weather-protected type for installation outdoors.

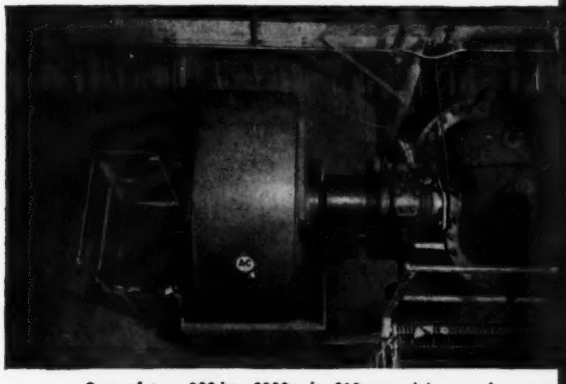
LET'S TAKE A LOOK AT TANNERS CREEK

One thing you're sure to notice at the Tanners Creek plant is that all the major auxiliaries for generating unit No. 2 are driven by Allis-Chalmers motors. Pictured here are a few of the larger ratings in this modern power plant of Indiana & Michigan Electric Company, a part of the American Gas and Electric system.

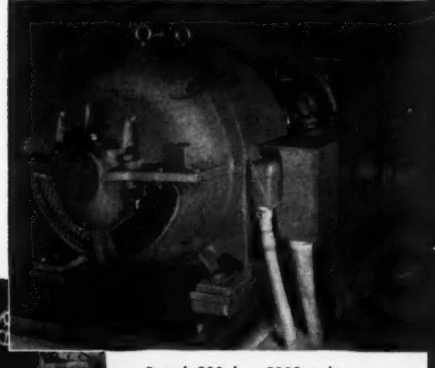
It's worthy of note that A-C is also building the motors for generating unit No. 3, scheduled for operation in 1954.

Allis-Chalmers builds a complete line of integral horsepower motors for power plant service, and your A-C representative can help you select the motors you need.

A-4084



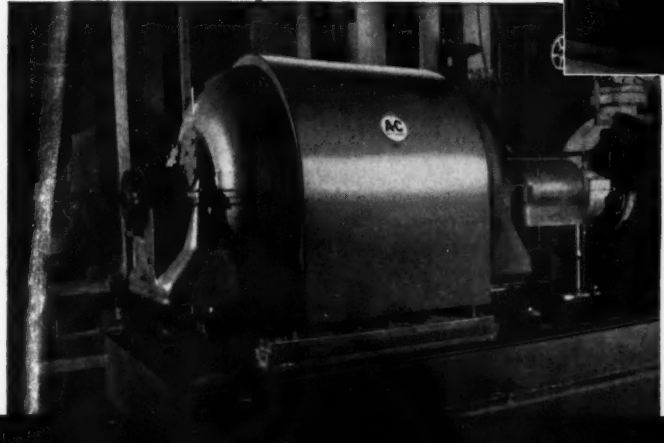
One of two 300-hp, 2300-volt, 218-rpm, drip-proof squirrel-cage motors driving circulating water pumps.



Rated 200 hp, 2300 volts, 1760 rpm, this drip-proof squirrel-cage motor driving an Allis-Chalmers screen wash pump is typical of the smaller ratings.

ALLIS-CHALMERS

Milwaukee 1, Wisconsin



These dependable boiler-feed pump motors are rated 2000 hp, 2300 volts, 3580 rpm each.

Cole Electric Co.

9439 Steller Drive TExas 0-4701 Culver City, Calif.

AIR BREAK DISCONNECTING SWITCH
34,500 volts—600 amperes—Type O-2
Vertical break. Three pole. Single throw. Group operated.
One pole shown.
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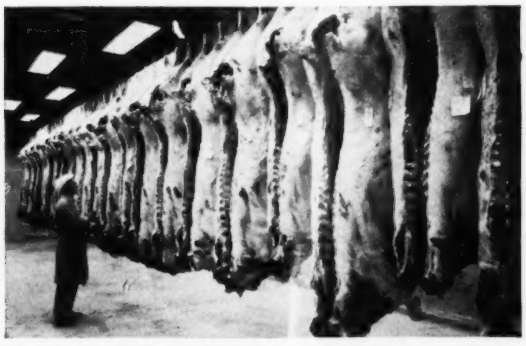
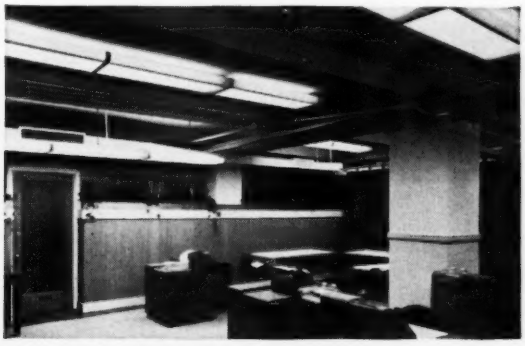
Can you afford not to improve your lighting?

Scientific instruments in the hands of engineers and experts are helping California firms increase their production sometimes as much as 15%. A reflectometer like that above can show you the amount of light that can be obtained from various surfaces. Our engineers will gladly survey your plant without charge to find ways to improve production through better lighting.



High surface reflectance is important. Its use here increases room illumination and assists in the inspection of meats. Lighting surveys point out many benefits to industrial managements.



Properly located lights of correct types produce good working illumination and the efficient use of surrounding colors. Employees benefit visually in pleasing environment. Plant output goes up.

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8X-53

What's in a Name?

Puffin A subarctic seabird, which sheds its grotesque colorful bill annually; prized by Eskimos for food and clothing.

Cormorant A voracious seabird trained in the Far East to catch fish; a ring about bird's throat prevents swallowing of fish.

Emu An Australian flightless bird with unusual flat breastbone; second largest living bird; related to ostriches.

Auk (*Great Auk*) A flightless northern seabird extinct 100 years; could dive to great depth; lived mostly at sea.

... these uncommon birds by any other names would still be uncommon!

P.C.E.A. is an uncommon sort of a "bird," too. Although we are strictly a regional trade association, devoted primarily to improving the Pacific Coast electrical industry's service to its customers, many of our activities have received national acclaim. Some P.C.E.A. projects, like the Unsafe Electrical Appliance Sales Control Ordinance, the Home Planning Institute Program and the Adequate Wiring and Electrical Living Program, have served as patterns which are being followed effectively throughout the entire country.

Yes, we've done a lot, but we have a lot yet to do. You can help, and you will benefit, by taking active part in the work of this uncommon organization. Contact either P.C.E.A. office for full information.

Pacific Coast Electrical Association

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681 Market Street, San Francisco 5, California